### DESIGN

# 1963 ANNUAL INDEX

## Volume 35-January to December

Including 26 regular issues of Machine Design plus four special issues — The Fasteners Book Issue, The Bearings Book Issue, The Nonferrous Metals Book Issue, and The Fluid Power Book Issue. Only articles and editorial items one-half page or larger are indexed.

### **AUTHOR INDEX**

### A

Accountius, O. A.—"Whiskered Metals," May 9, p. 194
Aliais, D. C.—"Cycloidal vs. Modified Trapezoidal Cams," Jan. 31, p. 92
Andersen, Johan—"Fastening Components to Shafts," June 20, p. 191
Armantrout, R. T.—"Magnetic Reed Switches," Dec. 19, p. 118
Arnold, James S.—"Computer-Calculated Environments," April 25, p. 126
Aronica, Charles and Joseph Miele—"Modular Instrument Assemblies," May 9, p. 212
Arruda, Joseph A. and Henry L. Mann—"Slip-Ring Assemblies," Jan. 17, p. 171
Artus, Charles H.—"Rubber Hose," March 28, p. 172

### R

Bael, Robert L.—"Technical-Economic Studies," May 9, p. 182
Barkan, P. and M. F. Sirkin—"Impact Behavior of Elastomers,"
Feb. 14, p. 172
Barnes, Sam
"Suited for Space," Jan. 17, p. 128
"Organism-Based Hardware," April 25, p. 134
"Life on Other Planets," June 6, p. 118
"Biomedical Engineering," July 4, p. 82
"Siege on Salt," Aug. 1, p. 90
"EAA: Designers on a Budget," Sept. 26, p. 152
"Gemini Status," Nov. 21, p. 156
"Bioelectric Power Sources," Dec. 5, p. 120
Barrett, J.,—"Cold-Drawn Steel Extrusions," Jan. 3, p. 106
Barry, John K.—Quick-Operating Fasteners," The Fasteners Book Issue, March 21, p. 154
Baty, Gordon B.—"New-Product Ideas," July 4, p. 76
Beach, John G.—"Coatings," The Nonferrous Metals Book Issue, Sept. 19, p. 85
Behrendt, H. R. and G. L. Taft—"Compressor Selection," The Fluid Power Book Issue, Dec. 12, p. 119
Belford, Richard B.
"Terminology," The Fasteners Book Issue, March 21, p. 4
"Standards," The Fasteners Book Issue, March 21, p. 14
"Screw-Thread Forms," The Fasteners Book Issue, March 21, p. 14
"Screw-Thread Forms," The Fasteners Book Issue, March 21, p. 14
"Screw-Thread Forms," The Fasteners Book Issue, March 21, p. 14

Berg, Winfred M.—"Servosystem Breadboards," Jan. 31, p. 111
Bergan, M. D. and W. P. Miller—"Aluminum Terminals," July 4, p. 117
Bertram, Joseph J.—"Multiple-Contact Electrical Connectors," June 20, p. 166
Biesemeyer, Warren E.—"Cylindrical and Journal Roller Bearings,"
The Bearings Book Issue, June 13, p. 96
Biackmun, Edward V. and Howard J. Rowe—"Aluminum," The Non-ferrous Metals Book Issue, Sept. 19, p. 4
Blewitt, D. C.—"Fixed-Fastener Squareness," July 18, p. 152
Blodgett, Omer W.
"Machine Feet and Mounting Lugs," Feb. 14, p. 157
"Welded Gear Housings," May 23, p. 142
Boes, D. J., P. H. Bowen, and J. R. McDowell—"Self-Lubricating Composite Materials," Aug. 29, p. 139
Boice, W. K.—"Adjustable-Speed Drive Performance," Aug. 29, p. 125
Bonham, Claude F.—"Acme Fower Screws," Aug. 1, p. 133
Bonnell, W. S.—"Selecting Centrifugal Pumps," April 11, p. 177
Booser, E. R.—"Bearing Materials," The Bearings Book Issue, June 13, p. 29
Borchardt, H. A.—"Designing Shafts," April 25, p. 150

Booser, E. R.—"Bearing Materials," The Bearings Book Issue, June 13, p. 29

Borchardt, H. A.—"Designing Shafts," April 25, p. 150

Borcina, David M.—"Soldering and Soldering Alloys," The Nonferrous Metals Book Issue, Sept. 19, p. 69

Bowen, P. H.—"Dry Lubricants," Nov. 7, p. 195

Bowen, P. H., D. J. Boes, and J. R. McDowell—"Self-Lubricating Composite Materials," Aug. 29, p. 139

Bowen, P. H. and W. H. Hickman—"Dry Lubricant Materials," July 4, p. 119

Braendel, Felix W.—"Pin Fasteners," The Fasteners Book Issue, March 21, p. 117

Brehmer, John R.—"Lubricating Devices," The Bearings Book Issue,

p. 119
Braendel, Felix W.—"Pin Fasteners," The Fasteners Book Issue, March 21, p. 117
Brehmer, John R.—"Lubricating Devices," The Bearings Book Issue, June 13, p. 15
Brenner, Harry 8.—"Fastener Evaluation," The Fasteners Book Issue, March 21, p. 46
Briggs, Janet Z. and Charles M. Parker—"Alloy Steels," June 6, p. 153
Brockway, Richard—"Cooling-Fin Efficiency," Oct. 24, p. 193
Broome, J. Wesley—"Servosystems for Position Control," April 25, p. 158
Brown, Harry K.—"Making Supervisory Decisions," Dec. 19, p. 103

p. 158

Brown, Harry K.—"Making Supervisory Decisions," Dec. 19, p. 163

Brownell, Wayne E.—"Ceramic Materials," June 20, p. 200

Bryant, Jerrus M.—"Self-Aligning Spherical Roller Bearings," The

Bearings Book Insue, June 13, p. 101

Burgman, H. A.—"Structural Adhesives," Nov. 21, p. 192

Bynum, Douglas Jr.—"Perforated Plates," Jan. 17, p. 179

Callaghan, Edmund E.—"Taming the Supermagnets," Feb. 14, p. 130 Campbell, John—"Testing Fractional-Horsepower Motors," Oct. 24,

p. 176 Campbell, John-"Electric Motor Noise," Aug. 15, p. 139 Carenbauer, William F.-"Design of Cast Bearings," The Bearings

Campbell, John—"Electric Motor Noise," Aug. 15, p. 139 Carenbauer, William F,—"Design of Cast Bearings," The Bearings Book Issue, June 13, p. 38 Caribters, Edward F.—"Numerical Control," May 9, p. 280 Caristen, Kirk—"Conditioners," The Fluid Power Book Issue, Dec. 12, 144 Charles

Garr. Charles

"Honeycomb-Panel Pasteners." Jan. 17, p. 167

"Tubing Clamps." Feb. 28, p. 129

Carr. Charles. F. P. Pipal, Charles Grun, and Martin Sulkes—"Batteries." April 11, p. 189

Carter, Richard L. and E. Noah Gould—"Job Assignment Method," July 18, p. 133

Castagna, E. G.—"High-Energy Joining of Plastics." Dec. 19, p. 148

Cerni, R. H.—"Electrical Analog Transducers." Nov. 21, p. 210

Charles, P. F.—"Rec.procating Compressors." The Finid Power Book Issue, Dec. 12, p. 122

Chelius, Jack and R. G. Christophersen—"Refractory Metals." The Nonferrous Metals Book Issue, Sept. 19, p. 61

Christophersen, R. G. and Jack Chelius—"Refractory Metals." The Nonferrous Metals Book Issue, Sept. 19, p. 61

Cymer, M. J.—"Coid Heading." The Nonferous Metals Book Issue, Sept. 19, p. 105

Constance, John D.—"National Professional Registration." Nov. 21, p. 152

D. 192
Cornwall, Edwin P.—"Welded Joints for Hard-Vacuum Systems," Aug. 15. p. 135
Cox. R. G.—"Hose, Fittings, and Couplings," The Fluid Power Book Issue, Dec. 12. p. 106
Crankshaw, E.—"Design of Strip-Type Bearings." The Bearings Book Issue, June 13. p. 46
Crech, Meri D.—"Screw-Thread Torque," May 23. p. 173
Crooks, Ronald D. and William R. Johnson—"Helical Springs for High Temperature," Aug. 15. p. 127
Cullen, Dan—"Extruding," The Nonferrous Metals Book Issue, Sept. 19. p. 101

D

D'Agostino, Robert-"Threaded Fasteners for Shock Loads," Feb. 14, D'Agostino, Robert—"Threaded Fasteners for Shous Losses, p. 169
Davis, J. R. and C. J. King—"Heat Exchangers," The Fluid Power Book Issue, Dec. 12, p. 96
Delmedge, A. H. and D. R. Sweeney—"Servovalves," The Fluid Power Book Issue, Dec. 12, p. 81
DeVries, Gerrit—"Dimensional Instability of Metals," Feb. 14, p. 151
Di Bartolo, E. A.
"Flow Control Valves," July 18, p. 167
"Flow Control Valves," The Fluid Power Book Issue, Dec. 12, p. 68
DiSapio, Alfred—"Bonded-Lubricant Coatings," May 23, p. 167
Di Tirro, D. A.—"Valves," The Fluid Power Book Issue, Dec. 12, p. 137

p. 137
Dix. Rollin C. "Inertial Switches," Sept. 26, p. 191
Dix. Rollin C. "Inertial Switches," The Fluid Power Book Issue, Dec. 12.
Dollinger, I. L. Jr. "Filters," The Fluid Power Book Issue, Dec. 12.

p. 93 Dubensky, R. C., C. C. Mellor Jr., and John E. Voorhees—"Hyper-critical-Speed Shafts," June 6, p. 182 Dunham, Bruce—"Lubrication, Oils and Greases," The Bearings Book Issue, June 13, p. 4

Eberly, Warren S.—"Controlled-Expansion Alloys," May 9, p. 236 Ehner, William J.—"Thermoplastic Parts," Aug. 29, p. 118 Ellison, John E.—"Solenoid Valves," Jan. 17, p. 160 Engebretson, M. E.—"Power Units," The Fluid Power Book Issue, Dec. 12, p. 116 Engstrom, Arthur H. and Frank Romeo—"Selecting Hydraulic Filters," May 9, p. 227

ngstrom, Arthur H. and Flank Nonferrous Metals Book Issue, Sept. 19, p. 227
bin, E. F.—"Titanium." The Nonferrous Metals Book Issue, Sept. 19, p. 50
titleman, David and Max Hoberman—"Torquemeters," Feb. 28, p. 134

Farquhar, Harold F .- "Predicting Blower Performance," Feb. 14, p. 159
p. 159
Favre, A. E.—"Aluminum Hand Forgings," Oct. 10, p. 172
Feist, Herman J.—"Functional Schematics," May 23, p. 120
Fisher, H. J. and E. E. Weismantel—"Beryllium," The Nonferrous
Metals Book Issue, Sept. 19, p. 55
Pinn, Richard A.—"Casting," The Nonferrous Metals Book Issue, Sept. 10, p. 15

Pinn, Richard A.—"Casting," The Nonferrous Metals Book Issue, Sept. 19, p. 91

Forray, Marvin and Malcolm Newman
"Thermal Stresses in Unrestrained Beams," Jan. 3, p. 133
"Thermal Stresses in Composite Beams," Jan. 31, p. 119
"Beam Columns," Feb. 28, p. 145
"Thermal Stresses in Laminated Circular Plates," March 28, p. 177
"Post-Bucking Deffection of Plates," Dec. 5, p. 163
Forsyth, E. T.—"Zinc-Coated Steel," Aug. 1, p. 121

Gabriel. Gustave and Herman H. Person—"Hysteresis-Synchronous Motors." July 18, p. 160
Gaston, S. P.—"Cold-Drawn Parts," April 25, p. 142
Gatzek, L. E.—"Wear-Resistant Finishes and Coatings." Aug. 1, p. 136
Gerstung, Harry S.—"Lubrication, Solids and Dry-Film Lubricants."
The Bearings Book Issue, June 13, p. 10
Glazier, Paul R.—"Needle Bearings," The Bearings Book Issue, June 13, p. 116
Goldstein, Howard S. and E. J. Rohrbach—"Radiation vs. Electronic Components." Jn. 3, p. 101

p. 116
 Goidstein, Howard S, and E. J. Rohrbach—"Radiation vs. Electronic Components." Jan. 3, p. 101
 Goodman, Thomas P.—"Dynamic Effects of Backlash," May 23, p. 150
 Goodwin, P. M.—"Composite Materials." July 18, p. 190
 Gould, E. Noah and Richard L. Carter—"Job Assignment Method," July 18, p. 133

July 18, p. 133 raves, L. Jr. and J. W. Sawyer—"Turbines Go to Sea," Oct. 24. D. 144

Gray, Albert Woodruff
"Patent Improvement or Infringement?." Jan. 31, p. 76
"When an Engineer Leaves a Company," March 28, p. 133
"Patent Notices and Penalties." Sept. 26, p. 144
"Patentability and Prior Publication," Nov. 7, p. 139
Grey, G. F.—"Resistance-Welded Fasteners." The Fasteners Book Issue, March 21, p. 68
Griffith, Ray C.—"Hydraulic Remote-Control Systems," Feb. 28, p. 122
Grimes, Glenn C.—"Bonded Joints for Rigid Plastics," Dec. 5, p. 166
Groshart, E. C. and C. F. Littlefield—"Galvanic Corrosion," May 9, p. 243

p. 243
Groves, Don-"Oceaneering." Aug. 15. p. 108
Grun, Charles, F. P. Pipal, Charles Carr, and Martin Sulkes-"Batteries." April 11. p. 189
Gure, Charles-P.—"Forging." The Nonferrous Metals Book Issue,
Sept. 19, p. 98

Haegh, Jan E. and George G. Landberg—"Zero-Leakage Motor-Pumps," Aug. 1, p. 127
Hall, A. M.—"Nickel," The Nonferrous Metals Book Issue, Sept. 19.

Halloerstadt, Louis—"Polyurethane Bearings. July 6, p. 101

Hall, A. M.—"Nickel," The Nonferrous Metals Book Issue, Sept. 19, p. 29

1983 Index—RLS

Hall, Bruce G.—"X-Y Recorders," Sept. 12, p. 160

Hallerstrom, H. C.—"Introduction," The Finid Power Book Issue, Dec. 12, p. 4

Hamm, Hans W.—"Bushing Assemblies," March 14, p. 179

Hanawalt, J. D.—"Magnesium," The Nonferrous Metals Book Issue, Sept. 19, p. 39

Hanneman, W. M.—"Washers," The Fasteners Book Issue, March 21, p. 103

Harris, Tedric A.—"Predicting Bearing Reliability," Jan. 3, p. 129

Harrisberger, Lee—"Motion Programing," Jan. 3, p. 114

Hayes, G. A. and John Pearson—"Explosive Welding," April 25, p. 170

Henke, Russ

"A-F Hydraulics," Feb. 28, p. 115

"Fluid Flip-Flops," March 14, p. 150

"Vane Pumps," The Fluid Power Book Issue, Dec. 12, p. 27

Hetrrich, F. R.—"Minimum-Inertia Counterweights," March 14, p. 160

Heustis, Lester G. and Raymond A. Quadt—"Cold Impact Extruding," The Nonferrous Metals Book Issue, Sept. 19, p. 104

Heyson, Alien E.—"Classification of Product Characteristics," June 20, p. 144

Hckman, W. H. and P. H. Bowen—"Dry Lubricant Materials," Interest 113

Heyson, Allen E.—"Classification of p. 144
Hickman, W. H. and P. H. Bowen—"Dry Lubricant Materials," July 4, p. 119
Higgins, Carter C.
"Low-Cost Stampings," April 11, p. 186
"Stamping," The Nonferrous Metals Book Issue, Sept. 19, p. 108
Hoberman, Max and David Ettleman—"Torquemeters," Feb. 28, p. 134
Hohmann, C. J. and A. O. Roberts Jr.—"Pump Selection," The Fluid
Power Book Issue, Dec. 12, p. 18
Hoiby, James C.—"General-Purpose Diesel Enignes," Dec. 5, p. 134
Hoos, David C.—"Precision Potentiometers," Jan. 3, p. 138
Hope, John A.—"Linear-Motion Bearings," The Bearings Book Issue,
June 13, p. 128
Horn, N. W.—"Gear Pumpa," The Fluid Power Book Issue, Dec. 12,
p. 22

June 13, p. 128

Horn, N. W.—"Gear Pumps," The Fluid Power Book Issue, Dec. 12, p. 22

Horvick, Ernest W.—"Zinc," The Nonferrous Metals Book Issue, Sept. 19, 1963, p. 46

Howard, George W.—"How to Be a Better Manager," Dec. 5, p. 112

Huntington, Roger—"Tomorow's Bodies and Frames," March 14, p. 144

Izzo, C. P.-"Outdoor Finish Systems," June 20, p. 197

Jacobellis, A. A.—"Accumulators," The Fluid Power Book Issue, Dec. 12, p. 37

Jacobs, Richard F.—"Sleeve-Bearing Fatigue," Dec. 19, p. 134

Johnson, C. R.—"Rotary Actuators," The Fluid Power Book Issue, Dec. 12, p. 59

Johnson, E. T.—"Design of Powder-Metal Bearings," The Bearings Book Issue, June 13, p. 53

Johnson, Peter K.—"Powder-Metal Forming," The Nonferrous Metals Book Issue, Sept. 19, p. 118

Johnson, Warren C.—"Adjustable-Speed Drives," Aug. 1, p. 102

Johnson, William R. and Ronaid D. Crooks—"Helical Springs for High Temperature," Aug. 15, p. 127

Johnstone, Denver T.—"Management of Quality Control and Reliability," March 14, p. 132

Jones, Lloyd Jr.—"Thrust Ball Bearings," The Bearings Book Issue, June 13, p. 82 Jones, Lloyd Jr.—"Thrust Ball Bearings," The Bearings Book Issue, June 13, p. 82 Jozefowicz, Edward—"Nonlinear Elastic Suspensions," Oct. 24, p. 169

Karger, D. W. and R. G. Murdick—"Managing Engineering Research," Aug. 1. p. 76
Kasper, I.—"Delayed-Action Mechanisms," April 25. p. 153
Kerr, R. W.—"Plastic Roller Chains," July 18. p. 164
Kienzie, Otto—"Plastic-Deformation Processes," Nov. 7, p. 200
King, C. J. and J. R. Davis—"Heat Exchangers," The Fluid Power Book Issue, Dec. 12, p. 96
Kiaus, E. E.—"Synthetic Liquid Lubricants," July 4, p. 126
Kinappe, L. F.—"Mechnism Tolerances," April 25, p. 155
Kostanty, Peter—"Fastening Moldings," Dec. 5, p. 153
Kull, Francis R.—"Set Screws," The Fasteners Book Issue, March 21, p. 61

Lake. H. K.—"Precious Metals," The Nonferrous Metals Book Issue, Sept. 19. p. 66
Landberg, George G. and Jan E. Haegh—"Zero-Leakage Motor-Pumps," Aug. 1, p. 127
Landers, Richard R.—"Product Safety Analysis," Feb. 28, p. 98
Lansky, Z. L.—"Comparison of Hydraulic and Pneumatic Systems,"
The Fluid Power Book Issue, Dec. 12, p. 7
Larson, G. A.—"Helical Gear and Worm Sets," March 14, p. 170
Lavoie, Francis J.—"Tensioning V-Belts," July 4, p. 94

Lewis Bernard T

p. 183

Lewis, Bernard T.
"Research Management.
Part 1: Organizing. Planning and Budgeting the Research Program." Aug. 15, p. 98
Part 2: Control and Evaluation of the Research Program." Aug. 29, p. 97
Lipson, Charles
"Wear Considerations in Design.
Part 1: Oct. 24, p. 156
Part 2: Nov. 7, p. 177
Part 3: Nov. 21, p. 182
Part 4: Dec. 5, p. 142
Part 5: Dec. 19, p. 140
Littlefield, C. F. and E. C. Groshart—"Galvanic Corrosion," May 9, p. 243

ittlefield, C. F. and E. C. Groshart—"Galvanic Corrosion," May v., p. 243
ong, Melvin E.
"Hydraulic Accumulators," Jan. 31. p. 107
"Fail-Eafe Hydraulic Circuits," March 14. p. 175
"Unloading Hydraulic Pumps," July 4. p. 113
one: John B. and Calvin E. Moeller—"Insulating Materials," Oct. 24, Donald-"Premounted Bearing Units," The Bearings Book

p. 196
Lower, Donald—"Premounted Bearing Units," The Bearings Book Issue, June 13, p. 122
Lundstrom, H. M.—"Zirconium," The Nonferrous Metals Book Issue, Sept. 19, p. 58
Lustig, Robert
"Hydraulic-System Reservoirs," June 6, p. 146
"Reservoirs," The Fluid Power Book Issue, Dec. 12, p. 89
Lutman, Byron O.—"Electric Adjustable-Speed Drives," July 4, p. 108

McCormick, H. E.—"Retaining Rings, Spiral-Wound Retaining Rings,"

The Fasteners Book Issue, March 21, p. 147

McDowell, J. R., D. J. Boes, and P. H. Bowen—"Self-Lubricating
Composite Materials," Aug. 29, p. 139

McKelvey, Ralph—"Tapered-Roller Bearings," The Bearings Book Issue,
June 13, p. 106

McLellan, George W.—"Glass," Sept. 12, p. 173

McMacken, D. C.—"Fluids," The Fluid Power Book Issue, Dec. 12,
p. 112 p. 112 Macduff, J. N.—"System Parameters from Vibration Tests," March 14.

Mackin, F. L.-"Symbols," The Fluid Power Book Issue, Dec. 12, Mackin, F. L.—"Symbols," The Finial Power Book Issue, Det. 12, p. 11
Mann, Henry L. and Joseph A. Arruda—"Slip-Ring Assemblies,"
Jan. 17, p. 171.
Manogue, R. A.—"Hydraulic Motors," The Finial Power Book Issue, Dec. 12, p. 53
Marsh, W.—"Cathode-Ray Oscilloscopes," June 6, p. 132
Marsh, W.—"Cathode-Ray Oscilloscopes," June 6, p. 132

Marsh. W.—"Cathode-Ray Oscilloscopes." June 8, p. 132
Marvin. Philip
"Technical Consultant." April 11, p. 144
"New Product Planning." June 6, p. 110
"Forecasting Profitable Products." Oct. 24, p. 134
"Sassey. Paul D.—"Captive or Self-Retaining Nuts, Clinch Nuts,"
The Fasteners Book Issue, March 21, p. 29, p. 144
Massey. Paul March 21, p. 29, p. 144
Mux, Abraham M.—"Metal Finishes." Aug. 29, p. 144
Mellor, C. C. Jr., John E. Voorhees, and R. C. Dubensky—"Hypercritical-Speed Shafts," June 6, p. 182
Menegakis, Demosthenes—"Computers for Hire," Jan. 17, p. 118
Michael, E. O.—"Narrow V-Belt Drive." Oct. 10, p. 209
Micks, William R.—"Materials for Minimum Weight." Sept. 26, p. 202
Miele, Joseph and Charles Aronica—"Modular Instrument Assemblies,"
May 9, p. 212

Micks, Williams

May 9, p. 212 "Captive or Self-Retaining Nuts, Anchor Nuts," The Fasteners Book Issue, March 21, p. 91 "Herr, W. P. and M. D. Bergan—"Aluminum Terminals," July 4.

p. 117
Miller, W. R. and D. K. Wright—"Contact Salva Materials," Oct. 24, Moeller, Calvin E. and John B. Loser—"Insulating Materials," Oct. 24, p. 196
Moon, Clifford G. Jr.—"Interpreting Motor Nameplates," Sept. 26, p. 168
Munsey, R. J.—"Retaining Rings, Wire-Formed Retaining Rings,"
The Fastesers Book Issue, March 21, p. 143
Murdick, Robert G.—"The Cognizant Engineer," April 25, p. 116
Murdick, R. G. and D. W. Karger—"Managing Engineering Research,"
Aug. I. p. 76
Murray, C. A. and G. H. Shepard—"High-Performance Reinforced Plastics," May 23, p. 176
Murray, S. F. and M. B. Peterson—"Lubrication Properties of Materials," Sept. 12, p. 200
Mussgnug, A. H.—"Inserts," Fasteners Book Issue, March 21, p. 103

Nelson, Edward N.—"Volumes of Elliptical Heads," April 11, p. 219
Newman, Malcolm and Marvin Forray
"Thermal Stresses in Unrestrained Beams," Jan. 3, p. 133
"Thermal Stresses in Composite Beams," Jan. 31, p. 119
"Beam Columns," Feb. 28, p. 145
"Thermal Stresses in Laminated Circular Plates," March 28, p. 177
"Thermal Stresses in Laminated Circular Plates," March 28, p. 177
"Post-Buckling Deflection of Plates," Dec. 5, p. 163
Nicol, John—"Pipe, Tubing, and Fittings," The Fluid Power Book Issue, Dec. 12, p. 99

iofson, C. T.—"Machining." The Nonferrous Metals Book Issue, Sept. 19, p. 115 ison, John-"Piston Pumps." The Fluid Power Book Issue, Dec. 12. Olofson, Olson.

Parker, Charles M. and Janet Z. Briggs—"Alloy Steels," June 6, p. 153 Parsons, Stuart O. and Joseph Seminara "Skills Inventory System," Feb. 14, p. 114 "Accident-Proof Controls," Oct. 10, p. 181 "Display Panels," Nov. 7, p. 165

Pattee. H. E.—"Brazing and Brazing Ailoys," The Nonferrous Metals Book Issue, Sept. 19. p. 75
Patrick. Robert L.—"Plantic Coatings for Metal Parts," Sept. 26, p. 195
Pearch. Robert W.—"Buckling in Rectangular Plates," Dec. 19. p. 145
Pearson, John and G. A. Hayes—"Explosive Weiding," April 25, p. 170
Person, Herman H. and Gustave Gabriel—"Hysteresis-Synchronous Motors," July 18, p. 160
Peterson, M. B. and S. F. Murray—"Lubrication Properties of Materials," Sept. 12, p. 200
Petrus, Stephen and William L. Seitz
"Single-Thread Engaging Nuts," The Fasteners Book Issue, March 21, p. 57
"Captive or Seif-Retaining Nuts, Caged Nuts," The Fasteners Book Issue, March 21, p. 95
"Spring Cilps," The Fasteners Book Issue, March 21, p. 132
Petros, Richard M. and Anthony J. Ruffini—"Selection of Rolling-Element Bearings," The Bearings Book Issue, June 13, p. 65
Pfeiffer, W.—"Bolted-Flange Assemblies," June 20, p. 193
Pierro, John J.—"High-Temperature Electrical Equipment," Jan. 31, p. 12

p. 122
Plerson. Robert R.—"Miniature and Instrument Bearings," The Bearings Book Issue, June 13, p. 85
Pipal, F. P., Charles Carr, Charles Grun, and Martin Sulkes—"Batteries," April 11, p. 189
Pippenger, J. J.—"Pressure-Control Valves," The Fluid Power Book Issue, Dec. 12, p. 63
Platzek, Richard C.—"Semiconductor Integrated Circuits," Oct. 10, p. 214
Pohs, Henry A.
"Part Numbers vs. Data Processing" Jan. 3, p. 82

Pohs, Henry A.

"Part Numbers vs. Data Processing," Jan. 3, p. 82

"In-Company Materials-Specifications System," Oct. 10, p. 146

Polleck, R. E. and E. H. Simpson—"Thermoplastics," March 28, p. 184

Primak, Alex and Gino Strazzabosco—"Critical Frequency of Vertical Shafts," Dec. 19, p. 122

Pritzlaff, John A.—"Deep-Diving Machines." Aug. 29, p. 108

Quadt, Raymond A. and Lester G. Heustis-"Cold Impact Extruding," The Nonferrous Metals Book Issue, Sept. 19, p. 104

Raudsepp. Eugene
"Hiring Engineers." March 28, p. 128
"Establishing an On-Campus Image, Employing Young Graduates 1,"
July 18, p. 128
"Engineers, Employing Young Graduates 2," Aug. 1, July 18, p. 128
"Keeping Young Engineers, Employing Young Graduates 2," Aug. 1,

"Reeping Young Engineers, Employing Young Graduates 2," Aug. 1, p. 84
"Why Retire the Leaders?" Nov. 7, p. 134
"Why Retire, L. M.—"Design of Plastic Bearings," The Bearings Book Issue, June 13, p. 59
Rideout, T. R.—"High-Speed Gearing," Aug. 15, p. 162
Rieger, N. F.—"Torsional Critical Speeds," Nov. 21, p. 207
Ringer, A. G.—"Motors," The Fluid Power Book Issue, Dec. 12, p. 130

Ringer, A. G.—"Motors," The Fluid Power Book Issue, Dec. 12, p. 130
Rippel, Harry C.

"Hydrostatic Bearings.
Part 1: Basic Concepts and Pad Design," Aug. 1, p. 108
Part 2: Controlling Flow with Restrictors," Aug. 15, p. 122
Part 3: Influence of Restrictors on Performance," Aug. 29, p. 132
Part 4: Bearing Friction and Film Thickness," Sept. 12, p. 170
Part 5: Hydrostatic Bearings," Sept. 26, p. 182
Part 6: Practical Flat-Pad Bearing Design," Oct. 10, p. 201
Part 7: Conical and Spherical Pads," Oct. 24, p. 185
Part 8: Cylidrical-Pad Performance," Nov. 7, p. 189
Part 9: Single and Multiple-Pad Journal Bearings," Nov. 21, p. 199
Part 10: Multirecess Journal Bearings," Dec. 5, p. 158
Roberts, A. O. Jr. and C. J. Hohmann—"Pump Selection," The Fluid Power Book Issue, Dec. 12, p. 16
Rohrbach, E. J. and Howards S. Goldstein—"Radiation vs. Electronic Components," Jan. 3, p. 101
Romeo, Frank and Arthur H. Engstrom—"Selecting Hydraulic Filters," May 9, p. 227
Rowe, Howard J. and Edward V. Blackmun—"Aluminum," The Non-ferrous Metals Book Issue, Sept. 19, p. 4
Rudy, John F.—"Welding and Welding Alloys," The Nonferrous Metals Book Issue, Sept. 19, p. 79
Ruffini, Anthony J.
"Bearing Noise,
Part 1: Analysis of Rolling-Element Bearings," May 9, p. 232
Part 2: Analysis of Silding Bearings," May 23, p. 158
Ruffini, Anthony J. and Richard M. Petros—"Selection of Rolling-Element Bearings," The Bearings Book Issue, June 13, p. 65
Rumbarger, John H.—"Thrust Roller Bearings," The Bearings Book Issue, June 13, p. 102

Sabanas, Mitchell-"Life Support," Sept. 12, p. 144
Sampson, M. B.-"Boosters," The Fluid Power Book Issue, Dec. 12,

Sampson, R. N. and H. R. Shepard—"Glass-Fiber Structures," April 11. p. 222
Saward, Robert D.—"Radial Ball Bearings," The Bearings Book Issue, June 13, p. 74
Sawyer, J. W. and L. Graves Jr.—"Turbines Go to Sea," Oct. 24, p. 144 Sampson, R. N. and H. R. Shepard-"Glass-Fiber Structures," April

p. 144
Schirmer. Earle V.—"Deep Drawing," The Nonferrous Metals Book Issue, Sept. 19, p. 110
Schoffield, Jack H.—"Blind Rivets," The Fasteners Book Issue, March 21, p. 128
Seltz, William L. and Stephen Petrus
"Single-Thread Engaging Nuts," The Fasteners Book Issue, March p. 87 tive or Self-Retaining Nuts, Caged Nuts," The Fasteners Book

21, p. 87

'Captive or Self-Retaining Nuts, Caged Nuts,'' The Fasteners Book Issue, March 21, p. 95

'Sapring Clips,'' The Fasteners Book Issue, March 21, p. 132

Seleno, A. A.—''Hydraulic Servo Drives,'' Oct. 10, p. 183

Seminara, Joseph L. and Stuart O. Parsons
'Skills Inventory System,'' Feb. 14, p. 114
''Accident-Proof Controls,'' Oct. 10, p. 181
''Display Panels,'' Nov. 7, p. 185

Seminara, Joseph L. and Jack M. Tevis—''Mockups: Plain and Fancy,''

June 20, p. 152

Sheppard, G. H. and C. A. Murray—"High-Performance Reinforced Flastics," May 23, p. 176 Sheppard, H. R. and R. N. Sampson—"Glass-Fiber Structures," April 11, p. 222 Sherwood, R. D.—"Instrument Couplings," April 11, p. 168 Sigel, Leon A.—"Evaporation Losses," March 28, p. 162 Simpson, E. H. and R. E. Polleck—"Thermoplastics," March 28,

p. 184
Singleton, Robert C.—"Arc-Welded Fasteners," The Fasteners Book Issue, March 21, p. 73
Sirkin, M. F. and P. Barkan—"Impact Behavior of Elastomers," Feb. 14, p. 172
Smith, F. Russell—"Unground Ball Baranania Santan

Sirkin, M. F. and P. Barkan—"Impact Behavior of Elastomers," Feb. 14. p. 172

Smith. F. Russell—"Unground Ball Bearings," The Bearings Book Issue, June 13, p. 94

Smoley, E. M.—"Sealing Gasketed Joints," Nov. 21, p. 174

Smotor-Clutch Drives," Feb. 14, p. 142

"Flywheel Machines." March 28, p. 148

Squitero, A. D.—"Electroformed Parts," May 9, p. 223

Stanton, Vincent A.—"Rocket Wire," Feb. 28, p. 140

Stech. Ernest L.—"Personal Productivity," Aug. 15, p. 105

Steward, John H.—"Captive or Self-Retaining Nuts, Self-Piercing Nuts," The Fastemers Book Issue, March 21, p. 101

Strazzabosco, Gino and Alex Primak—"Critical Frequency of Vertical Shafts," Dec. 19, p. 122

Strubell, G. C.—"Copper," The Nonferrous Metala Book Issue, Sept. 19, p. 18

Sulkes, Martin, F. P. Pipal, Charles Carr, and Charles Grun—"Batteries," April 11, p. 189

Sweeney, Donald R.
"Directional-Control Valves," June 20, p. 182
"Directional-Control Valves," The Fluid Power Book Issue, Dec. 12, p. 75

Sweeney, D. R. and A. H. Delmedge—"Servovalves," The Fluid Power

p. 75 Sweeney, D. R. and A. H. Delmedge—"Servovalves," The Fluid Power Book Issue, Dec. 12, p. 81

Taft, G. L. and H. R. Behrendt—"Compressor Selection," The Fluid Fower Book Issue, Dec. 12, p. 119

Tanner, William C.—"Adhesive Bonding," March 14, p. 192

Tevis, Jack M. and Joseph L. Seminara—"Mockups; Plain and Fancy,"
June 20, p. 152

Thomas, Edward U.—"Polarized Relays," March 28, p. 156

Thurgood, D. A.—"Doubly Overhung Shafts," Aug. 15, p. 159

Ungar, Eric E .- "Highly Damped Structures," Feb. 14, p. 162

Vanderploeg, Elmer J.—"Roll Forming," The Nonferrous Metals Book Issue, Sept. 19, p. 114

Voorhees, John E., C. C. Mellor Jr., and R. C. Dubensky-"Hyper-critical-Speed Shafts," June 6, p. 182 Votta, Frank A. Jr.-"Constant-Force Springs," Jan. 31, p. 102 Vroom, W. I. and R. F. Westover-"Friction Measurement," Feb. 28.

Walker, Gordon—"Bonded Solid-Lubricant Coatings," Jan. 17, p. 182
Waltermire, W. G.—"Studs," The Fasteners Book Issue, March 21, p. 65
Wambsganss, Martin W. Jr.
"Curve Fitting with Polynomials," April 25, p. 167
"Orifice Air Frow," Sept. 12, p. 197
"Wasko, Bernard—"Bead-Selt Drives," Nov. 7, p. 154
Watson, T. P.—"Linear Actuators," The Fluid Power Book Issue, Dec. 12, p. 126
Watson, T. P.—"Linear Actuators," The Fluid Power Book Issue, Dec. 12, p. 46
Watts, E. C.—"Cutting the Untouchables," Sept. 12, p. 151
Weismantel, E. E. and H. J. Fisher—"Beryllium," The Nonferrous Metals Book Issue, Sept. 19, p. 55
Weiss, A. E.—"Die Casting," The Nonferrous Metals Book Issue, Sept. 19, p. 96

Metala Book Issue, Sept. 19, p. 50
Weiss, A. E.—"Die Casting," The Nonferrous Metala Book Issue,
Sept. 19, p. 96
Weiss, Harvey—"Analyzing Periodic Functions," Sept. 26, p. 199
Wenman, W. A.—"Spinning," The Nonferrous Metals Book Issue,
Sept. 19, p. 112
Westover, R. F. and W. I. Vroom—"Friction Measurement," Feb. 28,

Westover, R. F. and W. I. Vroom—"Friction aleasanched, p. 150
Wilcock, Donald F.—"Selection of Plain Bearings," The Bearings Book Issue, June 13, p. 20
Williams, H. L.—"Errors Are Inevitable," Jan. 17, p. 133
Williams, Robert E.—"Microfilm," Sept. 12, p. 134
Wilson, Warren E.—"Optimizing Hydrostatic Transmissions," Jan. 3, p. 120
Wise, C. E.
"Mass Transit," Nov. 7, p. 142
"Rail Transit Stages a Revival," Nov. 21, p. 168
Wright, D. K. Jr, and W. R. Miller—"Contact Stresses," July 18, p. 185
Wurzel, Hugo F.—"Retaining Rings, Stamped Retaining Rings," The

p. 185 urzel, Hugo F.—"Retaining Rings, Stamped Retaining Rings," The Fasteners Book Issue, March 21, p. 139

Yungkurth, C. R .-- "Investment-Cast Prototypes." Feb. 28, p. 133

### Z

Zeidman, Gordon G.
"Built-in Conveyors,
Part 1: Selection and Use of Belts and Components," Jan. 17,
p. 144
Part 2: Power Requirements and Controls," Jan. 31, p. 115

### SUBJECT INDEX

Editorial material in this section is classified according to the following system: 3 2 148 3/28,(4.0)Flywheel Machines ...... Spotts

- 1. Title.
- 2. Author's last name (see Author Index for complete name). Departments in regular issues are denoted by the following code:

News ..... Er gineering News Scan ..... Scanning the Field for Ideas DIA ...... Design in Action

3. Date of issue. Machine Design Book Issues are denoted by the following code:

F ..... Fasteners Book Issue (March 21)

B ..... Bearings Book Issue (June 13) N ... Nonferrous Metals Book Issue (September 19)

P ..... Fluid Power Book Issue (December 12)

- 4. Page number.
- 5. Number of pages in article or editorial item.

## Electrical and Electronic Drives, Controls and Systems

ELECTRIC MOTORS, DRIVES					Rectifier-Controlled Drill Shrugs Off Load		8/10	142	(1.0)
		9.00	* 40	(4.0)	Variations Tame Little Squirt				(1.0)
Flywheel Machines  Electric Adjustable-Speed Drives	Spotts Lutman			(4.0)	Electronic Controls Tame Little Squirt Phototube Demodulates Laser Beam	News	2/28,		(0.7)
Hysteresis-Synchronous Motors	Person	7/18.			Laser Gyro Bends Light Beams Around				
Static Control for Adjustable-Speed					a Ring		3/14,	12	(0.8)
Zero-Leakage Motor-Pumps	Johnson			(6.0)	Transistor Flashes Light Signals Across Its Base		3/28,	12	(0.5)
Zero-Leakage Motor-Pumps  Electric-Motor Noise	Haegh Campbell			(20.0)	Color-TV Picture Tube: X-Rays Aim a		0.00	- 14	(0.7)
Adjustable-Speed Drive Performance	Boice			(7.0)	Single Electron Gun		3/28,	14	(0.7)
Interpreting Motor Nameplates	Moon	9/26,	168	(10.0)	Basic New System Controls AC-Motor Speed		7/4.	10	(0:7)
Testing Fractional Horsepower Motors	Campbell	10/24,	176	(9.0)	Magnetics Called Good Bet in Radiation-		11/7	10	(0.5)
Straight-Line Motor Propels Rail-Riding Trolley	News	1/3.	. 8	(0.7)	Resisting Computers		1/7.		(0.6)
Synchronous Motors Discard Their Brushes	News			(0.6)	Scored Mirror Pulses Light Beam		1/17,		
Toroidal-Wound DC Torque Motor Steered					Tuned Ignition Circuit		1/17,		
Mariner	DIA			(1.0)	Card Positions Potentiometer Arms	Scan	1/31,	98	(0.5)
Rotor Travels Axially	Scan			(0.5)	Tilted Magnetic Lens		1/31,		
Solenoid Motor Releases Brake	Scan			(1.0)	Oscillator Controls Speed		1/31,		(0.5)
Inside-Outside Fan	Scan			(0.7)	Photocell Triggers Sparkplug		3/28, 4/11,		
Dual-Purpose Winding	Scan	8/29,	124	(0.5)	Discriminating Transistors	Scan	5/9.		(0.5)
Windings Form Capacitor	Scan			(0.6)	Capacitor Delays Relay Release		6/20,		
Hybrid Motor	Scan	10/10,			Trapped Charge		7/4.	107	(0.5)
Rolling Rotor Provides Slow-Speed Output	Scan	12/19,	133	(1.0)	Shuttling Armature	Scan	10/24,		
POWER SOURCES					Reactor Adjusts Charging Current	Sean	11/7.	161	(0.5)
Batteries	Pipal	4/11	189	(30.0)	CIRCUITS, CONNECTORS,	COMPO	NENT	2	
Bioelectric Power Sources	Barnes			(5.0)	CIRCUITS, CONNECTORS,	COMPO			
Fuel Cell Burns Natural Gas	News			(0.7)	Slip-Ring Assemblies	Arruda			(8.0)
Snap Generator Powers a Lighthouse	News			(0.4)	Servosystem Breadboards	Berg	1/31,		
Supercold Coil Generates Current in	News	1 /91	2.4	(0.7)	Modular Instrument Assemblies				(7.0)
Superhot Gas	Mems	1,31,	14	(0.1)	Aluminum Terminals	Miller		117	
Applicability	News	10/24.	12	(0.5)	Semiconductor Integrated Circuits	Platzek	10/10,	214	(3.8)
Fuel Cell "Burns" Liquid Hydrocarbons	Name	44.04	10	70.7×	New Package Improves Pelletized Circuits	News	1/3,		(0.7)
with Air	News	11/21.	12	(0.7)	Great Efficiency in Lamps	News	1/31,	22	(0.5)
Tests in Orbit	News	12/5.	10	(0.6)	Electroluminescent Panel Won't Give Up Ghost	News	1/31,	26	(0.6)
Constant Current Supply	Scan	1/31,			Permanent Magnet Turns On and Off	News	2/14.		(1.0)
Reversing Flux Field	Scan			(1.0)	Air Gun Fires Light-Pattern Terminations	News	8/1,	14	(1.3)
Pressure Indicates Charge Level	Scan	4/25.	149	(0.4)	Superconducting Material	News	8/29,	22	(0.5)
Switching Circuit Creates D-C Trans- former	Scan	12/19,	130	(0.6)	Metallic Ring Attracts Atoms, Brighten- ing Hot Fluorescent Lamps	News	9/26,	10	(0.5)
					Shunt Sidetracks 200 Kiloamps To Pro-	TACMS	0/20,	20	(0.0)
SWITCHES, RELAYS					tect Measuring Circuits	News	10/10,	10	(0,7)
Polarized Relays	Thomas			(6.0)	Beam-Dividing Circuit: Key to New Laser Applications	News	11/7.	6	(0.5)
Inertial Switches	Dix	9/26,			Radiation-Resisting Circuits	News	11/7,		(0.2)
Magnetic Reed Switches	Armantrout	12/19,	118	(4.0)	Linear Motor Ejects Parcels from				
Fiber-Optics Tubes	News	3/14,	30	(0.8)	Package-Go-Round	DIA			(1.0)
Flapping Fiber Replenishes Charge	Scan	3/14.	165	(1.0)	Hot Water Dries Boggy Suits	DIA	7/29, 3/14,		(0.6)
Separate Shorting Bar	Sean	3/14,			Spring Contacts Flip-Flop Segments		5/9,		(0.3)
Flux-Sensitive Conductors	Sean	10/24,	168	(0.4)	Floating Discs Maintain Contact	Scan	7/4.		(0.5)
SENSING DEVICES, TRANSI	DUCERS				Electrical Escapement	Scan	11/7.	164	(1.0)
Torquemeters	Ettelman	2/28	134	(6.0)	INSTRUMENTS DECORDED	METE	20		
Electrical Analog Transducers	Cerni			(3.8)	INSTRUMENTS, RECORDERS		K.S		
Strain Gages Synchronize Twin Diesels	DIA			(2.0)	Cathode-Ray Oscilloscopes				(9.0)
Load Cells Indicate "Handicap" for	~				X-Y Recorders	Hall			(6.0)
Computer Bonds Hand British Conital	DIA	11/7,	149	(1.0)	Display Systems Design	Seminara News	1/7.		(12.0)
Computer Reads Hand-Printed Capital	News	4/11.	14	(0.7)	Radar Charts Aircraft's Progress				(0.5)
Riding Piggyback on Atlas Missiles	News	4/25,	22	(0.5)	Small-Boat Sonar Picks Up Fish, Rocks,				
Spinning Nuclei Signal Angular Displace- ment in Mercury-Isotope Gyro	News	7/20	10	(1.0)	and Messages	News			(0.7)
Doppler Ear Orients Deep-Diving Sub	News	8/29,			Laser Rangefinder	News	7/4,		(0.5) $(0.7)$
Chemical Sensor Changes Color When					Mechanical Navigator Pinpoints Land	Atewa	174,	AW	(0.1)
Struck by Laser-Transit Beam	News	9/26.			Vehicle's Position	News	8/1,	10	(0.5)
Hydrogen Fires	News Scan	9/26, 2/14,			Zoom-Lines TV Displays the Target in Rendezvous Simulator	News	9/12.	14	(0.8)
Vibration Slit Positions Autocollimator	Scan	4/25.			Electric Pen Burns Line	Scan	1/31,		(0.5)
Pulses Indicate Charge	Scan		142		Clipped-On Tape	Scan	3/14,		(0.5)
Reflections Activate Photocell	Scan	6/20,			Continuous Two-Line Readout	Scan	5/23,		(1.0)
Holes Pinpoint Target	Scan	6/20,	179	(0.5)	Weaving Trace Shows Error	Scan	7/18,	158	(0.5)
Light Beam Follows Movement	Scan		102		Magnet and Grid Record Blade Vibration	Scan	12/5,	152	(1.0)
Photocella Straddle Line	Scan	7/18,			GENERAL				
Temperature-Compensated Fingers Eddy Currents Indicate Speed	Scan Scan	7/18, 9/26,				Debet			
Photocells Indicate Set Points	Scan	10/10,		(1.0)	Radiation vs Electronic Components Of Mold and Missiles	Rohrbach			(4.0)
Resistance Indicates Medium	Scan	10/24,			Ignition System Trends	(Article) DIA	7/18, 4/11,		(5.0)
Energy Ratio Indicates Temperature	Scan	11/7,			High-Frequency Jolt Puts the Bite on	Actual	4/11,	00	(1.0)
Strain Alters Tune of Vibrating Wire	Scan	11/21,			Skinless Dogs	DIA .			(2.0)
Disturbed Magnetic Field Measures Flow	Scan	12/5,	149	(0.4)	Radio Beam Pinpoints Runway Centerline	News	1/3,	10	(0.5)
CONTROLS, CONTROL CO	MPONEN	TS			Missile Checker Finds the Illness and Prescribes the Cure	News	1/3,	14	(0.5)
			0.00	/# F1	Pulse Crumples Foil	Scan	1/17,		(1.0)
Numerical Control	Carlberg				First Plastic Laser Emits "New" Light	Name	2 /00		
Static Country for Augustable-Speed Drives	Johnson	0/1,	102	(6.0)	Wave Lengths	News	3/28,	8	(0.7)

## Fluid Drives, Controls and Systems

FLUIDS, LUBRICANTS					Flapping Paddles			. 134	(0.6)
Bonded Solid-Lubricant Coatings	Walker	1/17	7, 183	(2.4)	Cam-Piston Moves Fluid			. 169	
Bonded-Lubricant Coatings	DiSapio		3, 167		Pressure Helps Balance Loads		11/21		
Oils and Greases,		B 6/13	3. 4						
Solid and Bonded-Film Lubricants					VALVES				
Dry Lubricant Materials			1. 119		Solenoid Valves	Ellison	1/17		
Synthetic Liquid Lubricants			1, 126 7, 195		New Shapes for Fluid Flip Flops	Henke		150	
Fluids	MacMac		, 100	(0.0)	Directional-Control Valves			182	
	ATRICE AND ONE	P 12/13	2, 112	(4.0)	Flow-Control Valves	DiBartol	0 7/18	107	(18.0)
Compounds Cut Friction Coefficient	News	1/31	1, 10		troiling Flow with Restrictors	Rippel	8/15	122	(5.0)
Aluminum-Healing Oil Eliminates Friction	News	9/12	1. 12	(0.7)	Pressure-Control Valves	Pippenge	r	-	
800-F Hydraulic Fluid Doubles as Anti- friction-Bearing Lubricant	News	9/26	12	(0.6)	Diam Control Wales	Differential	P 12/12	63	(5.0)
					Flow-Control Valves	DiBartol	P 12/12.	69	(6.7)
FILTERS, RESERVOIRS, HEA	T EXC	HANG	ERS	•	Direction-Control Valves	Sweeney	P 12/12		
Selecting Hydraulic Filters	Engstron	n 5/9	. 227	(5.0)	Servovalves	Sweeney	P 12/12	. 81	(8.0)
Hydraulic-System Reservoirs	Lustig		146		Valves (Pneumatic)	DiTirro	P 12/12,	137	(7.0)
Reservoirs	Lustig	P 12/12	. 89	(3.7)	Valve Changes Fluid Viscosity, Cycles 2000 Times Per Second	News	2/14.	10	(0.7)
Filters	Dollinger				Tracker Pushes Back at Soldier to Stay	Atoma	4/14		
Heat Exchangers Conditioners (Pneumatic)	King	P 12/12			On Target	News	9/26,		
Ice-Free Areas	Carlsten News	1/3			Valve Kills Engine	Sean	2/28,		
Bucket-Size Cooler: 3.6 K from 250,000	A10 MG	*10		(0.0)	Plate Controls Flow Route	Scan	4/11,		
rpm	News	1/31	, 8	(0.8)	Bi-Directional Relief Valve	Sean	4/11, 5/23,		(0.5)
Sea-Water Converter: Metal Sheet Evap-		0.00		(0.8)	Hydraulic Safety Lock Valve	Scan		220	(0.6)
orates Water and Condenses Vapor	News	2/28	, 8	(0,7)	Sleeves Open Ball Valves	Scan		226	(1.0)
Induction Coil Heats Gas Steam to 50,000	News	6/20	. 10	(1.0)	Sleeve Swallows Solids	Scan		142	(0.5)
Powder-Metal Filters Clean Air For					Balis Maintain Squeeze	Scan		105	(1.0)
Rotating Hammer	DIA		. 120		Self-Adjusting Flapper	Sean	9/12,	168	(1.0)
Contaminant-Conscious Filter Traveling Tuyeres	Sean		119						
traveling layeres	acan	8/10	102	(1.0)	SEALS				
PIPE, TUBING, FITTINGS					Sealing Gasketed Joints	Smoley	11/21.		(4.0)
Rubber Hose	Artus	3/28	172	(5.0)	Elastomeric Spring Washers	Scan	1/17,		(0.5)
Pipe, Tubing, and Fittings	Nicol ,	P 12/12	99	(7.0)	Pressure Relieves Seal	Scan .	2/14, 3/14,		(1.0)
Hose, Fittings, and Couplings	Cox	P 12/12	106	(5.8)	Lip Seal Clamps Itself	Sean Sean	3/19,		(0.5)
Plastics Design	(Article)				Double-Acting U-Rings	Scan	7/4.		(0.5)
Spring-Loaded Cone	Scan		159		Gapless Piston Ring	Scan	10/10,		(0.5)
Tube Limits Filling of Dispenser Cup Pulsing Sleeve Moves Fluid	Sean		149		Concave-Convex Ring Seals Itself Under				
ruining bieeve atoves rigid	scan	1/10	100	(0.5)	Pressure	Scan	12/5,	151	(0.5)
CYLINDERS, ACCUMULATO	RS, BO	OSTE	RS		SYSTEMS and ASSEMBLIES				
Hydraulic Accumulators	Long	1/31,	107	(4.0)		CHARLE	0.00	*00	
Accumulators	Jacobellis				Hydraulic Remote-Control Systems Fail-Safe Hydraulic Circuits	Griffith Long	2/28, 3/14.		(3.0)
Panetara		P 12/12		(5.0)	Servosystems for Position Control	Broome	4/25,		(9.0)
Boosters Linear Actuators (Hydraulic)	Sampson Watson	P 12/12, P 12/12,		(6.9)	Hydraulic Servo Drives	Seleno	10/10.		
Linear Actuators (Pneumatic)	Watson	P 12/12,			Comparison of Hydraulic and Pneumatic	WATER OF THE PARTY	20, 201	****	(40.0)
Pneumatic Ram Creates Stationary	***********	A Larle	140	(0.0)	Systems	Lansky		7	(3.7)
Crashes	DIA	5/9,	206	(2.0)	Power Units	Engebrets	on P 12/12,	116	(2.6)
Synchronized Cylinders Raise Blockhouse	DIA	5/0	200	(2.0)	Pneumatic Controls Will Steer Gemini-		A Aughan	110	18.07
Roof	Scan	1/17.		(0.5)	Landing Paraglider	News	7/18,	14	(0.5)
Piston Forms Armature	Scan	3/28			Hydraulie Hookup Simplifies Multiple	DIA	* 10	0.7	
Free-Wheeling Tempiate Stylus	Scan	4/25.			Steering	DIA	1/3,		(0.6)
Piston Adjusts Compression Ratio	Sean		222	(0.5)	Pinless Prop Drive	DIA	1/17,		(2.0)
Pistons Form Stop	Scan	5/23,	148	(0.6)	One-Motor Fork-Lift Truck	DIA	2/14,		(2.0)
Linkage Prevents Wind Up	Scan	5/23,	148	(0.4)	Speed Controller Uses Manifold Pressure		-,,		,0.0,
Compression Provides for Extension	Scan	6/20,		(0.5)	Feedback	DIA	2/28,	118	(3.0)
Cushioned Sleeve Seals Piston	Scan			(1.0)	Redundant Servos Provide Fail Safe Flight Control	DIA	3/28,	149	(2.0)
Concentric Pistons	Scan Scan	10/24,		(1.0)	White-Collar Miner Operates Creeping	A/A/A	0/ 40,	174	(4.0)
Piston Controls Pressure	Scan			(1.0)	Coal Mine	DIA	9/12,	156	(2.0)
	NO. COLUMN	22/22	210	(4.0)	GENERAL				
PUMPS, MOTORS, COMPRES	SSORS					141			
				(0.0)	Optimizing Hydrostatic Transmission	Wilson	1/3,		(8.5)
	F7		177	(9.0)	Predicting Blower Performance	Farquhar	2/14.		(3.0)
Centrifugal Pumps	Bonnell	4/11,		(4.0)					(2.0)
Unloading Hydraulic Pumps	Long	7/4,	113	(4.0)	A-F Hydraulics	Henke	2/28,		(4.7)
Unloading Hydraulic Pumps		7/4, 8/1,	113 127	(4.0) (6.0) (5.6)		Henke Brehmer	2/28, B 6/13,	15	(4.7)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps	Long Haegh	7/4, 8/1,	113 127 16	(6.0)	A-F Hydraulics	Henke	2/28, B 6/13,	15 197	(4.7) (2.0) (4.2)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps	Long Haegh Hohmann Horn Henke	7/4, 8/1, P 12/12, P 12/12, P 12/12,	113 127 16 22 27	(6.0) (5.6) (5.0) (5.0)	A-F Hydraulics Lubricating Devices Orifice Air Flow	Henke Brehmer Wambsgar Peterson Hallerstro	2/28, B 6/13, nss 9/12, 9/12, m	15 197 200	(2.0) (4.2)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps	Long Haegh Hohmann Horn Henke Olson	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12,	113 127 16 22 27 32	(6.0) (5.6) (5.0) (5.0) (4.7)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction	Henke Brehmer Wambsgar Peterson Hallerstro	2/28, B 6/13, nss 9/12, 9/12, m P 12/12,	15 197 200 4	(2.0) (4.2) (3.0)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors	Long Haegh Hohmann Horn Henke Olson Manogue	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12,	113 127 16 22 27 32 53	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction Fluid Power Symbols	Henke Brehmer Wambsgar Peterson Hallerstroi	2/28, B 6/13, nss 9/12, 9/12, m P 12/12, P 12/12,	15 197 200 4 11	(2.0) (4.2) (3.0) (5.0)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators	Long Haegh Hohmann Horn Henke Olson Manogue Johnson	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12,	113 127 16 22 27 32 53 59	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction Fluid Power Symbols V/STOL Hovers and Cruises Equally Well	Henke Brehmer Wambsgar Peterson Hallerstro	2/28, B 6/13, nss 9/12, 9/12, m P 12/12,	15 197 200 4	(2.0) (4.2) (3.0)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft	7/4. 8/1. P 12/12. P 12/12. P 12/12. P 12/12. P 12/12. P 12/12. P 12/12.	113 127 16 22 27 32 53 59 119	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction Fluid Power Symbols	Henke Brehmer Wambsgar Peterson Hallerstroi	2/28, B 6/13, nss 9/12, 9/12, m P 12/12, P 12/12,	15 197 200 4 11 6	(2.0) (4.2) (3.0) (5.0)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection Reciprocating Compressors	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft Charles	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12,	113 127 16 22 27 32 53 59 119 122	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0) (4.0)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction Fluid Power Symbols V/STOL Hovers and Cruises Equally Well Whip-Cracking Blades Double Helicopter	Henke Brehmer Wambsgar Peterson Hallerstro Mackin News	2/28, B 6/13, nss 9/12, 9/12, m P 12/12, P 12/12, 6/6,	15 197 200 4 11 6	(2.0) (4.2) (3.0) (5.0) (0.6)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection Reciprocating Compressors Motors (Pneumatic)	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft Charles	7/4. 8/1. P 12/12. P 12/12. P 12/12. P 12/12. P 12/12. P 12/12. P 12/12.	113 127 16 22 27 32 53 59 119 122	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction Fluid Power Symbols V/STOL Hovers and Cruises Equally Well Whip-Cracking Blades Double Helicopter Speed Misted Glass Detects Liquids Temperature-Sensitive Coupling	Henke Brehmer Wambsgar Peterson Hallerstron Mackin News	2/28, B 6/13, nss 9/12, 9/12, m P 12/12, 6/6, 11/7, 1/3,	15 197 200 4 11 6 14 128 158	(2.0) (4.2) (3.0) (5.0) (0.6) (0.7)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection Reciprocating Compressors Motors (Pneumatic) Air-Turbine Capstan Controls Mile-a-Minute Tape	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft Charles	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12,	113 127 16 22 27 32 53 59 119 122 130	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0) (4.0)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction  Fluid Power Symbols V/STOL Hovers and Cruises Equally Well Whip-Cracking Blades Double Helicopter Speed Misted Glass Detects Liquids Temperature-Sensitive Coupling Sleeve Grips Uniformly	Henke Brehmer Wambsgai Peterson Hallerstron Mackin News News Scan Scan	2/28, B 6/13, nss 9/12, 9/12, m P 12/12, 6/6, 11/7, 1/3, 1/17, 7/4,	15 197 200 4 11 6 14 128 158 106	(2.0) (4.2) (3.0) (5.0) (0.6) (0.7) (0.5) (0.5) (0.5)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection Reciprocating Compressors Motors (Pneumatic) Air-Turbine Capstan Controls Mile-a-Minute Tape Production Cryopump Condenses Water	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft Charles Ringer	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/13,	113 127 16 22 27 32 53 59 119 122 130	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0) (4.0) (6.4)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction  Fluid Power Symbols V/STOL Hovers and Cruises Equally Well Whip-Cracking Blades Double Helicopter Speed Misted Glass Detects Liquids Temperature-Sensitive Coupling Sleeve Grips Uniformly Pressure-Balanced Magnet	Henke Brehmer Wambsgai Peterson Hallerstron Mackin News News Stan Scan Scan	2/28, B 6/13, nss 9/12, 9/12, P 12/12, 6/6, 11/7, 1/3, 1/17, 7/4, 7/18,	15 197 200 4 11 6 14 128 158 106 158	(2.0) (4.2) (3.0) (5.0) (0.6) (0.7) (0.5) (0.5) (0.5)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection Reciprocating Compressors Motors (Pneumatic) Air-Turbine Capstan Controls Mile-a- Minute Tape Vapor at 212,000 Cfm Vapor at 212,000 Cfm	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft Charles Ringer DIA News	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/14, P 12/14, P 12/14, P 12/14, P 12/14,	113 127 16 22 27 32 53 59 119 122 130	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0) (4.0) (6.4) (2.0)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction Fluid Power Symbols V/STOL Hovers and Cruises Equally Well Whip-Cracking Blades Double Helicopter Speed Misted Glass Detects Liquids Temperature-Sensitive Coupling Sleeve Grips Uniformly Pressure-Balanced Magnet Trolley Permits Remote Connections	Henke Brehmer Wambsgai Peterson Hallerstron Mackin News News Stan Scan Scan Scan Scan	2/28, B 6/13, nss 9/12, 9/12, P 12/12, 6/6, 11/7, 1/3, 1/17, 7/4, 8/15,	15 197 200 4 11 6 14 128 158 106 158 133	(2.0) (4.2) (3.0) (5.0) (0.6) (0.7) (0.5) (0.5) (0.5) (0.5) (0.7)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection Reciprocating Compressors Motors (Pneumatic) Air-Turbine Capstan Controls Mile-a- Minute Tape Production Cryopump Condenses Water Vapor at 212,000 Cfm Hydraulic Commutator	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft Charles Ringer DIA News Scan	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, 7/18, 8/1, 3/14,	113 127 16 22 27 32 53 59 119 122 130 144	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0) (4.0) (6.4) (2.0) (0.5)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction  Fluid Power Symbols V/STOL Hovers and Cruises Equally Well Whip-Cracking Blades Double Helicopter Speed Misted Glass Detects Liquids Temperature-Sensitive Coupling Sleeve Grips Uniformly Pressure-Balanced Magnet Trolley Permits Remote Connections Spin-Stabilized Float	Henke Brehmer Wambsgai Peterson Hallerstroi Mackin News News Scan Scan Scan Scan Scan Scan	2/28, B 6/13, nss 9/12, 9/12, m P 12/12, 6/6, 11/7, 1/3, 1/17, 7/4, 7/18, 8/15, 8/15,	15 197 200 4 11 6 14 128 158 106 158 133 134	(2.0) (4.2) (3.0) (5.0) (0.6) (0.7) (0.5) (0.5) (0.5) (0.5) (0.7) (0.4)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection Reciprocating Compressors Motors (Pneumatic) Air-Turbine Capstan Controls Mile-a-Minut Tape Production Cryopump Condenses Water Vapor at 212,000 Cfm Hydraulic Commutator Rotary Helical Flux	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft Charles Ringer DIA News Scan Scan	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, 7/18, 8/1, 3/14, 4/11.	113 127 16 22 27 32 53 59 119 122 130 144 10 169 172	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0) (4.0) (6.4) (2.0) (0.5) (0.5)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction  Fluid Power Symbols V/STOL Hovers and Cruises Equally Well Whip-Cracking Blades Double Helicopter Speed Misted Glass Detects Liquids Temperature-Sensitive Coupling Sleeve Grips Uniformly Pressure-Balanced Magnet Trolley Permits Remote Connections Spin-Stabilized Float Magnetically Trapped Helix	Henke Brehmer Wambsgai Peterson Hallerstroi Mackin News News Scan Scan Scan Scan Scan Scan	2/28, B 6/13, ass 9/12, 9/12, mP 12/12, P 12/12, 6/6, 11/7, 1/13, 1/17, 7/4, 8/15, 8/15,	15 197 200 4 11 6 14 128 158 106 158 133 134 122	(2.0) (4.2) (3.0) (5.0) (0.6) (0.7) (0.5) (0.5) (0.5) (0.5) (0.7) (0.4) (1.0)
Unloading Hydraulic Pumps Zero-Leakage Motor-Pumps Pump Selection Gear Pumps Vane Pumps Piston Pumps Hydraulic Motors Rotary Actuators Compressor Selection Reciprocating Compressors Motors (Pneumatic) Air-Turbine Capstan Controls Mile-a- Minute Tape Production Cryopump Condenses Water Vapor at 212,000 Cfm Hydraulic Commutator	Long Haegh Hohmann Horn Henke Olson Manogue Johnson Taft Charles Ringer DIA News Scan	7/4, 8/1, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, P 12/12, 7/18, 8/1, 3/14,	113 127 16 22 27 32 53 59 119 122 130 144 10 169 172 149	(6.0) (5.6) (5.0) (5.0) (4.7) (5.8) (4.0) (3.0) (4.0) (6.4) (2.0) (0.5)	A-F Hydraulics Lubricating Devices Orifice Air Flow Properties of Materials to Aid Lubrication Introduction  Fluid Power Symbols V/STOL Hovers and Cruises Equally Well Whip-Cracking Blades Double Helicopter Speed Misted Glass Detects Liquids Temperature-Sensitive Coupling Sleeve Grips Uniformly Pressure-Balanced Magnet Trolley Permits Remote Connections Spin-Stabilized Float	Henke Brehmer Wambsgai Peterson Hallerstroi Mackin News News Scan Scan Scan Scan Scan Scan	2/28, B 6/13, nss 9/12, 9/12, m P 12/12, 6/6, 11/7, 1/3, 1/17, 7/4, 7/18, 8/15, 8/15,	15 197 200 4 11 6 14 128 158 106 158 133 134 122 163	(2.0) (4.2) (3.0) (5.0) (0.6) (0.7) (0.5) (0.5) (0.5) (0.5) (0.7) (0.4)

## Mechanical Drives, Controls and Systems

INTERNAL-COMBUSTION EN	IGINES				Selection of Rolling Element Bearings Bearing Life and Loads	Ruffini (Chapter)	B 6/13,		
The Big Performance Push	(Article)	3/28,	136	(4.0)	Radial Ball Bearings		B 6/13,		
Wankel's Rotary Powers a Roadster	(Article)	12/5,	130	(3.0)	Angular-Contact Ball Bearings		B 6/13,	78	(3.5)
General-Purpose Diesel Engines	Hoiby	12/5,	134	(8.0)	Thrust Ball Bearings	Jones	B 3/16,	82	
Diesel Afterburner Consumes Engine Ex- hausts	News	3/14.	10	(0.5)	Miniature and Instrument Bearings	Pierson	B 6/13,		
2308L: Mercedes-Benz Builds a New	145.40	W/ A W,	10	(0.0)	Unground Ball Bearings		B 6/13,	94	(2.0
Sports Car	News	3/28,	10	(0.7)	Cylindrical and Journal Roller Bearings	Biesemeyer	6/13,	96	(5.0
Fuel Injection System	News	7/4,	23	(0.5)	Self-Aligning Spherical Roller Bearings	Bryant	B 6/13,	101	(4.4
In-Line Engine Makes Room for Boat Passengers	News	8/15.	6	(1.0)	Tapered Roller Bearings	McKelvey	B 6/13.	106	(5.4
Rotary Engine: Four-Stroke Cycle in		-,		44.47	Thrust Roller Bearings	Rumbarger	B 6/13,	110	(4.0
Five Combustion Chambers	News	10/10,	6	(1.0)	Needle-Roller Bearings	Glazier	B 6/13,		
'64 Cars: Two Competing Compacts Built in Britain	News	11/7.	8	(0.5)	Premounted Bearings	Lower	B 6/13,		
Propless Wankel Drive	DIA	1/3,		(1.0)	First True Magnetic Bearing: Rotating				
Fanless Front-Drive Ford	DIA	1/3,		(2.0)	Shaft Floats on Electromagnet-Cor-	News	3/14.	14	(1.3
Marine V-8 Runs Warm with Heat Ex-	DEA	4 (0)		(1.0)	rected Fields	246 83	0/11		1,410
changers	DIA	4/20	, 131	(1.0)	Antifriction-Bearing Chatter	News	7/4.	12	(1.0
TURBINES, ROCKETS, ATOM	MIC EN	SINE	5		New Material and Processing Technique Triple Bearing Life	News	8/1.	8	(0.7
Mid-Year Test of Electric Propulsion					Bearings Eliminate Backlash	Scan	7/18.		
Planned by NASA	(Article)	1/3,	92	(4.0)	Ball-Pivot Equalizes Loading	Scan	8/29.	123	(0.5
Chrysler's Turbine Car	(Article)	6/6,	124	(4.0)	DIAIN HYDDOSTATIC	EADING	25		
Turbines Go to Sea	Graves	10/24,		(6.0)	PLAIN and HYDROSTATIC	BEARING			
Tests Start for Apollo's Escape Motor	News	1/17.		(0.7)	Bushing Assemblies	Hamm	3/14,	179	(3.7
Atomic Barge Carries Power to the Army Heat-Cycled Motor Fires After Freezing	News	1/17,		(0.5)	Bearing Noise, Part 2: Analysis of Slid- ing Bearings	Ruffini	5/23.	158	(9.0
Four in a Cluster Ignite Together	News	1/31,		(0.5)	Polyurethane Bearings	Halberstad		151	
Rockets Pollute Upper Atmosphere	News	2/14.		(0.8)	Selection of Plain Bearings		B 6/13,		
Flying Reactor Breaks Apart and Burns	News	4/25,		(0.7)	Bearing Materials and Properties		B 6/13,	29	(8.5
Nozzle Unfolds, Bettering Boosters at					Design of Cast Bearings	Carenbauer		20	
High Altitudes	News	7/18,	6	(1.0)	Design of Strip-Type Bearings	Crankshaw	B 6/13,	38	(7.7)
Landing Trainer	News	8/29,	8	(0.5)	trengti of btrip-type bearings		B 6/13,		
Underwater Steam Engine Converts	*******	0.00			Design of Powder-Metal Bearings	Johnson	B 6/13,	53	(6.0)
Atomic Heat to Sound	News	9/12,	8	(8.0)	Design of Plastic Bearings	Rentschler	B 6/13.	59	(6.0)
Snap-9A: Nuclear Generator Bolos Abroad a Satellite	News	10/24,	10	(0.7)	Premounted Bearings		B 6/13,		
Solar-Hydrogen Rocket Passes First					Linear Motion Bearings		B 6/13,		
Tests	News	11/21,		(1.4)	Design of Hydrostatic Bearings, Part 1:				
Electric Propulsion	News	12/5,	22	(0.7)	Basic Concepts and Part Design	Rippel	8/1,	108	(10.0)
Underwater Firings	News	12/19,	6	(0.7)	Hydrostatic Bearings, Part 2: Controlling Flow with Restrictors	Rippel	8/15.	122	(5.0)
Business Airplane Harnesses Twin Turbo-	27	10/10		10.0	Design of Hydrostatic Bearings, Part 3:				
One Lever Controls Power on Compact	News	12/19,	14	10.01	Influence of Restrictors on Perform-	Rippel	8/29.	132	(7.0)
Argo Plane	DIA	3/28,	140	(2.0)	Design of Hydrostatic Bearings, Part 4:	Aug grant	07,501		
					Bearing Power and Film Thickness	Rippel	9/12,	170	(3.0)
DRIVES and TRANSMISSION	15				Design of Hydrostatic Bearings, Part 5: Bearing Temperature and Power	Rippel	9/26.	182	(9.0)
Narrow V-Belt Drives	Michael	10/10,	209	(5.0)	Design of Hydrostatic Bearings. Part 6:	a tripipe .	0,40,		(414)
Bead-Belt Drives	Wasko	11/7,	154	(6.0)	Practical Flat-Pad Bearing Design	Rippel	10/10,	201	(8.0)
Gears in the Wheels Multiply Torque Where It's Needed	News	9/26.	14	(0.8)	Design of Hydrostatic Bearings, Part 7: Conical and Spherical Pads	Rippel	10/24.	185	(8.0)
Two-in-One Transmission	DIA			(1.0)	Design of Hydrostatic Bearings, Part 8:				
Combined Brake and Drive Synchronize					Cylindrical-Pad Performance	Rippel	11/7,	189	(6.0)
Satellite Tape	DIA			(1.0)	Design of Hydrostatic Bearings, Part 9: Single and Multiple-Pad Journal				
Dutch Compact Uses V-Beit Drive Lightweight Attack Trainer Has Split	DIA	5/23,	138	(2.0)	Bearings	Rippel	11/21,	199	(8.0)
Path Gear Box	DIA	5/23,	140	(1.0)	Design of Hydrostatic Bearings, Part 10:	Dinnel	10/6	180	/5 A)
Overrunning Clutches Parcel Out Power	DIA	6/6,	130	(1.0)	Multirecess Journal Bearings	Rippel Jacobs	12/5, 12/19,		
Chain-Drive Positions Two-Acre Radio Telescope	DIA	6/20,	158	(2.0)	Air Pillow Separates Superhard Surfaces	News	1/17,		
Aneroid and Variable Vanes Improve					Table Floats on Air Bearings While Test-				
Transmission Performance	DIA	10/10,			ing OAO Controls	News	5/9,	10	(0.5)
Spinning Balls Adjust Ratio	Scan			(1.0)	SHAFTS, COUPLINGS, U-JO	INTS			
Pneumatic "Barbs"	Scan	6/20,			Instrument Couplings	Sherwood	4/11	168	(4.0)
Orbiting Pinion Oscillates Without Back-	SCALL	****	100	(0.0)	Designing Shafts	Borchardt	4/25,		
lash	Scan	12/5,	150	(1.0)	Hypercritical-Speed Shafts	Voorhees	6/6.		(4.2)
Lobed Shaft Provides Reversible Wedg-	Sean	12/5.	151	(0.5)	Doubly Overhung Shafts	Thurgood	8/15.		(2.0)
ing	acan	14/0,	101	(0.0)	Driveshaft Synchronizes STOL Engine	DIA	3/28,	144	(2.0)
CHAIN, BELT, GEAR COMP	ONENTS				Snap-Together U-Joint	Scan	3/14,		(0.5)
Helical Gear & Worm Sets			170	(E 0)	Nested Springs Damp Shocks	Scan	4/25.		(1.0)
Welded Gear Housings	Larson Blodgett	3/14. 5/23.			Coaxial-Coil Conveyor	Sean Sean	6/6, 7/18,		(1.0)
Acme Power Screws	Bonham	8/1,		(2.0)	Magnetic "Loads" Reduce Deflection	Sean	10/10.		(0.5)
High-Speed Gearing	Rideout	8/15.			Spring Acts as Torsional Flywheel	Scan			(1.0)
Tensioning V-Belts	Lavoie			(8.0)					
Plastic Roller Chains	Kerr	7/18,	164	(3.0)	CLUTCHES, BRAKES				
Differentials Synchronize Heavenly Mo-	DIA	8/1	9.8	(2.0)	Predicting Performance of Motor-Clutch		400		
	Scan	7/4.		(0.5)	Only Two Diese Stop the VARCE	Spotts			(5.0)
tions					Only Two Discs Stop the LARC-5 Disc Brakes	DIA	6/20,		(2.0)
Conveyor Reverses Roll	Scan	8/29,	168						
	Scan	8/29,	161			DIA	12/19,	110	(2.0)
Conveyor Reverses Roll		8/29,	163	, 4127	Two-Stage Vacuum Assist Marries Discs and Drums	DIA	12/19,		
Conveyor Reverses Roll	s				Two-Stage Vacuum Assist Marries Discs and Drums	DIA	12/19.	112	(2.0)
Conveyor Reverses Roil Polygon Measures Errors  ROLLING-ELEMENT BEARING Predicting Bearing Reliability Searing Noise, Part 1: Analysis of Roil-				(4.0)	Two-Stage Vacuum Assist Marries Discs and Drums  Large Floating Discs Compensate for Wear			112	(2.0)
onveyor Reverses Roil olygon Measures Errors  COLLING-ELEMENT BEARING redicting Bearing Reliability earing Noise, Part 1: Analysis of Roil-	s		129	(4.0)	Two-Stage Vacuum Assist Marries Discs and Drums	DIA	12/19.	112 114	(2.0)

						1			
Inboard Discs Keep Cool Up Front	DIA	12/19.	116	(1.0)	Deformable Cam Surface	Scan	6/20.	181	(0.5)
Retracting Rubber Rings	Sean	5/9.	220	(0.9)	Overlapping Cam Segments	Scan	7/4.	106	(0.5)
Diaphragm Eliminates Axial Friction	Sean	6/20,	181	(0.5)	Self-Correcting Linkages	Scan	9/26.	179	(1.0)
Balls Prevent Backspin	Scan	11/7.	162	(0.6)	Acceleration Actuates Lock	Scan	10/10.	179	(0.5)
					Inputs Modify Linkage	Scan	11/7.	161	(0.5)
CAMS, LINKAGES, MECHAI	SMSIN				Band Integrates Rotations	Scan'	11/21.	179	(0.5)
Cycloidal vs Modified Trapezoidal Cams	Allais	1/21	00	(8.0)	Pins Regulate Period	Sean	11/21,	181	(0.6)
Cycloidal Carriage Leaves Trocholdal	Amais	1/31,	192	(5.0)	Oscillating Saw Cuts Only Solids	Scan	12/19,	130	(0.4)
Tracks	(Article)	2/14.	126	(4.0)	Double Eccentrics Provide Stroke Ad-				
Minimum-Inertia Counterweights	Hertrich	3/14.		(5.0)	justment	Scan	12/19,	131	(1.0)
Delayed-Action Mechanisms	Kasper	4/25.		(2.0)					
Mechanism Tolerances	Knappe	4/25.		(3.0)	MISCELLANEOUS				
Dynamic Effects of Backlash	Goodman	5/23,		(8.0)	20 to 20 to 20				
Dodge for '64	News	8/15.	10	(0.7)	Built-In Conveyors	Zeidman	1/17.	144	(11.0)
Surgeon's Stitch-Gun Never Releases					Project Wheeltrack: Army's Mobility Showdown	(Article)	2/28.	110	(5.0)
Needle	DIA	2/28,	117	(1.0)	Radial-Cord Truck Tire Outperforms All	(Article)	4/40.	110	(0.0)
Automatic Chain Lock	DIA	3/14,	158	(0.5)	Others	News	5/9,	10	(0.5)
Lugs Shorten Plug Door Travel	DIA	3/28,	146	(1.0)	Honeycombed Inner Tread Guards Tube				
Variable-Camber Prop is Cammed into	T37.6				from Blowouts	News	5/23.	10	(0.7)
Position	DIA	7/4.		(1.0)	Aluminum Track Shoes	News	8/15,	23	(0.6)
Robot Tennis Player Keeps 'Em Coming Solid-State Shutter Foils Smug Shutter	DIA	9/12,	198	(1.0)	Self-Inflating Gas Lowers Spacecraft	**		-	
Bug	DIA	12/5,	126	(2.0)	Cadillac for '64: New Performance and	News	9/12,	6	(0.6)
Telescoping Tubes Project Lines	Scan	1/3.		(1.0)	Convenience	News	10/10.	8	(0.7)
Flyweights Lift Drum	Scan	1/3,		(1.0)	Control System Approved for Mohole's	210 110	20, 20,		10.07
Planetary Pinions Hold Adjustment	Sean	1/31.		(1.0)	Anchor	News	10/10.	14	(0.5)
Rods Orient Satellite	Sean	2/14.		(0.5)	Wheel Tilts Threads to Bite Into Soft				
Bowing Reed Moves Plunger	Sean	2/28.		(0.5)	Ground	DIA	3/14,	156	(2.0)
Floating Idlers	Scan	3/14.		(0.5)	Low Bogie Pivot Point Reduces Tire				
Skewed Spring-Shaped Rollers	Sean	3/28,		(1,0)	Scrub on Semi	DIA	5/23,	135	(1.0)
Piunger Locks Ball	Scan	3/28.			Wave-Compensating Hoist Smooths Rough-Sea Lifting	DIA	10/24.	150	(2.0)
Template Guides Compass Leg	Scan	3/28,		(0.4)	Inhuman Team Sidelines Lab Analysts.	DIA			
Sliding Pin Varies Ratio	Scan	5/9,		(1.0)	Double Rotation Provides Centrifugal	LILA	11/7,	100	(2.0)
Constant-Force Mechanism	Scan	6/6.		(1.0)	Pounding	Scan	12/19.	129	(1.0)
							, 10,		

## **Assembly Components**

### **FASTENERS**

Honeycomb-Panel Fasteners	Carr	1/17.	167	(4.0)
Threaded Fasteners for Shock Loads	D'Agostin	0 2/14,	169	(3.0)
Terminology	Belford	F 3/21,	- 6	(6.0)
Standards	Belford	F 3/21.	10	(3.2)
Screw Thread Forms	Belford	F 3/21.	14	(4.0)
Materials	(Chapter)	F 3/21,	18	(4.4)
Finishes and Coatings	(Chapter)	F 3/21,	23	(6.0)
Joint Design	(Chapter)	F 3/21,	29	(17.0)
Fastener Evaluation	Brenner	F 3/21.	46	(3.2)
Tapping Screws	(Chapter)	F 3/21,	50	(10.3)
Set Screws	Kuii	F 3/21.	61	(4.0)
Studs	Waltermir	e		
		F 3/21.	65	(2.6)
Resistance Welded Fasteners	Grey	F 3/21,	68	(4.8)
Arc Welded Fasteners	Singleton	F 3/21,	73	(7.6)
Locknuts	(Chapter)	F 3/21,	81	(5.6)
Single Thread Engaging Nuts	Seitz	F 3/21,	87	(3.4)
Anchor Nuts	Mihaly	F 3/21,	91	(3.2)
Caged Nuts	Seitz	F 3/21,	95	(2.2)
Clinch Nuts	Massey	F 3/21,	98	(3.0)
Self-Piercing Nuts	Steward	F 3/21.	101	(2.0)
Inserts	Musegnug	F 3/21.	103	(5.0)
Washers	Hanneman	F 3/21,	108	(3.4)
Sealing Fasteners	(Chapter)	F 3/21,	112	(4.1)
Pin Fasteners	Braendel	F 3/21.	117	(5.5)
Small Rivets	(Chapter)	F 3/21,	123	(5.0)
Blind Rivets	Schoffeld	F 3/21.	128	(4.0)
Spring Clips	Seitz	F 3/21.	132	(6.5)
Stamped Retaining Rings	Wurzel	F 3/21.	139	(4.0)
Wire-Formed Retaining Rings	Munsey	F 3/21.	143	(4.0)
Spiral-Wound Retaining Rings	McCormick			
		F 3/21,	147	(6.2)
Quick-Operating Fasteners	Barry	F 3/21,	154	(5.5)
Screw-Thread Torque	Creech	5/23,	173	(3.0)
Fastening Components to Shafts	Andersen	6/20,	191	(2.0)
Bolted-Flange Assemblies	Pfeiffer	6/20,	193	(4.0)
Fixed-Fastener Squareness	Blewitt	7/18,	152	(3.0)
Screw-Thread Fits	Belford	11/7,	186	(3.0)

Fastening Moldings	Kostanty	12/5,	153	(5.0)
Helicopters Try Rolling-Deck Landings	News	3/14,	6	(1.0)
Sheet-Metal Fastener Drills Its Own Hole	News	11/7,	10	(1.0)
Fingers Hold Nut	Scan	1/17.	158	(0.5)
Clip Holds Bolt	Scan	2/14.	150	(0.5)
Double-Ended Bolt	Scan	11/21,	181	(0.4)

### SPRINGS, VIBRATION and SHOCK ISOLATORS

i				
Constant-Force Springs	Votta	1/31.	102	(5.0)
Helical Springs for High Temperatures	Johnson	8/15,	127	(5.0)
Nonlinear Elastic Suspensions	Jozefowicz	10/24.	169	(7.0)
Tiny Springs Weigh Space-Particle Impacts	News	2/28.	30	(0.7)
Two Competing Compacts Built in Britain	News	11/7.	8	(0.5)
Air-Spring Mercedes	DIA	1/17.		(2.0)
Mazda Rides on Rubber Torsion Springs	DIA	3/14.		(0.5)
Springs Give Titan II Post-Nuclear				
Bounce Back	DIA	11/21,	166	(2.0)
Jittery Jets Calmed by Air Springs	DIA	12/5.	125	(1.0)
Rubber Layers Deform	Scan	2/28,	126	(0.8)
Adjustable Weight Rotates	Scan	2/28.	126	(1.2)
Floating Spring Mount	Scan	3/14.	167	(0.5)
Compact High-Rate Spring	Scan	4/11,	175	(0.5)
Spring Isolates Shafts	Sean	6/20.	176	(1.0)
Impacts Cancel Vibrations	Scan	7/4.	107	(0.5)
Springs Float Ring Gear	Scan	7/18.	155	(1.0)
Balls Form Shock "Fuse"	Sean	8/1.	119	(0.5)
Variable Stiffness Spring	Sean	9/12.	166	(1.0)
Rolling Flexures	Scan	9/12,	167	(0.5)
Torque-Regulating Spring	Scan	9/26.	178	(1.0)
Deflection Controls Characteristics	Scan	10/10,	178	(0.5)
Stranded Spring	Scan	10/24.	166	(0.5)
Conical Cushion Absorbs Thrust	Scan	12/19	132	(0.5)

### OTHER ASSEMBLY COMPONENTS

Concentric Tubes Form Tumblers	Seminara	10/10,	181	(2.0)
Accident-Proof Controls	Carr	2/28,	129	(4.0)
Tubing Clamps	Sean	11/7.	162	(0.4)
Magnet Provides Preload	Scan	1/3.	112	(0.4)

### **Materials and Finishes**

METALS					Three-Panel Windows Keep Out the Heat When Dyna-Soar Re-enters the	News	6/6	10	(0.5)
Dimensional Instability of Metals	DeVries	2/14.	151	(6.0)	Atmosphere	Mems	0/0.	20	(0.0)
Whiskered Metals	Accounting	8 5/9,	194	(6.0)	Plastic, Luminescent, and Ceramic: Three New Engineering Glasses	News	7/18.	12	(1.0)
Controlled Expansion Alloys	Eberly	5/9,	236	(7.0)	Ceramic Foam Beats Nose-Cone Heat				
Alloy Steels	Briggs	6/6.	153	(24.0)	During Re-Entry	News	11/7,	12	(0.5)
Oceaneering	Groves	8/15.	108	(6.0)	Inorganic-Mat Insulation Shrugs off		******		10 F
Aluminum	Rowe	N 9/19.	4	(13.4)	1500 F	News	11/21,	14	(0.5)
Copper	Strubell	N 9/19.	18	(11.0)	Glass-Fiber Pieces Form Large Rocket-	News	12/5.	8	(0.7)
Nickel	Hall	N 9/19.	29	(9.9)	Motor Cases	Mema	24/10		, 0.17
Magnesium	Hanawalt	N 9/19.	39	(7.0)	Carbide-and-Ceramic Coating Protects Dyna-Soar Nose Skid	DIA	2/14.	135	(1.0)
Zine	Horvick	N 9/19.	46	(4.0)	Engine-Girdling Graphite Seals Forms				
Titanium	Erbin	N 9/19,	80	(4.5)	Economical Firewall	DIA	7/4.	90	(1.0)
Beryllium	Weismante								
		N 9/19,	55	(2.8)	FINISHES, ADHESIVES				
Zirconium	Lundstron		7.0						
Defeation Mateix	cm u.	N 9/19,			Outdoor Finish Systems	Izzo	6/20,	197	-(3.0)
Refractory Metals	Chelius	N 9/19,			Developments in Wear-Resistant Finishes	Controls	0.71	120	(2.9)
Precious Metals	Lake	N 9/19,			and Coatings	Gatzek		136	
Metal Fibers: Diameters Approach Zero	News	2/14,	8	(0.6)	Metal Finishes for Product Appearances	Max	8/29,		(2.1)
Superstrong Beryllium Tests Out Like High-Tensile Steel	News	8/29.	12	(0.6)	Coatings	Beach	N 9/19,		(5.6)
Vacuum Pouring Produces Superpure	News	0/20,	16	(0.0)	Plastic Coatings for Metal Parts	Patrick	9/26,		(4.0)
Metals Buperpure	News	12/5.	12	(0.6)	Structural Adhesives	Burgman	11/21,		(7.0)
Olds Rediscovers Iron	DIA	10/10,			Bonded Joints for Rigid Plastics	Grimes	12/5,	166	(3.2)
	L'AIR	10, 10,	100	12.01	Special Metal Coating Boosts Limits on Working Temperature	News	10/24,	12	(0.5)
PLASTICS, RUBBER					Metallie "Dust Wall"	News	11/7,		(0.5)
	_				Adhesives Stiffen Cruiser Decks	DIA	8/1,	100	(1.0)
Impact Behavior of Elastomers	Barkan			(3.7)					
Thermoplastics	Simpson	3/28,			COMPOSITE MATERIALS, S	TRUCTI	URES		
High-Performance Reinforced Plastics	Sherrard	5/23,							
Thermoplastic Parts	Ehner	8/29,			Machine Feet and Mounting Lugs	Blodgett	2/14,	157	(2.0)
Self-Lubricating Composite Materials	Bowen	8/29,			Rocket Wire	Stanton	2/28,	140	(5.0)
Plastic Coatings for Metal Parts	Patrick	9/26.	195	(4.0)	Glass-Fiber Structures	Sheppard	4/11,	222	(2.4)
Plastic Bullet Cleans a Barrel While	News	8/29.	8	(0.5)	Composite Materials	Goodwin	7/18,	190	(3.5)
Improving Range	News	0/29,		(0.0)	Zinc-Coated Steel	Forsyth	8/1,	121	(6.0)
Frameless Train	DIA	7/4.	92	(1.0)	Insulating Materials	Moeller	10/24,	196	(5.3)
Screw Closes Leak	Scan	1/31.			A Three-Cornered Boom	News	1/31,	23	(0.6)
Self-Resetting Vent Panels	Scan			(0.5)	Brazing Technique Tumbles Honeycomb	News	2/28.	28	(0.7)
NONMETALLICS (except PI	astics.	Rubbe	er)		Thermoplastic Laminate Bids for Unusual Structure Jobs	News	6/6,	10	(0.5)
The state of the s					Controlled Explosion Clads One Metal on				
Ceramic Materials	Brownell	6/20,	200	(3.1)	Another	News	10/24,	8	(0.5)
Glass	McLellan	9/12,	173	(24.0)	Three-Layer Dimples Shield Spacecraft	**	20.00	***	(0.0
Edible Hardware Furnishes Emergency					from Heat	News	12/19,		(0.6)
Food in Space	News	5/23,	- 6	(1.0)	Selective Honeycomb	Scan	8/1,	120	(0.6)

## Manufacturing Methods and Processes

METAL CASTING					Distortion-Free Draw Forms Cylindrical Scale	News	1/31,	29	(1.0)
Investment-Cast Prototypes	Yungkurti	2/28.	133	(1.0)	JOINING PROCESSES				
Casting	Flinn	N 9/19,	91	(4.4)	JOHNING I KOCESSES				
Die Casting	Weiss	N 9/19,	96	(1.7)	Adhesive Bonding	Tanner	3/14,	192	(2.5)
Molten Metal Vaporizes Plastic-Foam					Explosive Welding	Pearson	4/25,	170	(3.9)
Pattern	News	7/4,	8	(0.7)	Welded Joints for Hard-Vacuum Systems	Cornwall	8/15,	135	(4.0)
New Designs, Handsome and Humble,	97	44/04	00	(1 A)	Soldering and Soldering Alloys	Borcina	N 9/19,	69	(5.7)
Win Awards	News	11/21,	23	(1.0)	Brazing and Brazing Alloys	Pattee	N 9/19,	75	(3.4)
					Welding and Welding Alloys	Rudy	N 9/19,	79	(5.7)
STAMPING, FORMING, FOR	GING				High-Energy Joining Methods for Plastics	Castagna	12/19,	148	(2.5)
	-				Tape Adhesive Bonds the Boeing 727	News	1/17.	14	(0.7)
Cold-Drawn Steel Extrusions	Barrett	1/3,		(3.0)					
Low-Cost Stampings	Higgins	4/11,		(3.0)	MACHINING, OTHER PROC	ESSES			
Cold-Drawn Parts	Gaston	4/25,		(4.0)					
Designing Electroformed Parts	Squitero	5/9,		(3.7)	Cutting the Untouchables	Watts	9/12,		1000
Forging	Gure	N 9/19,	98	(2.9)	Machining	Olofson	N 9/19,	116	(1.8)
Extruding	Cullen	N 9/19,	101	(3.0)	Electron Beam Stays in Focus When Voltage Changes	News	2.72	**	(A F)
Cold Impact Extruding	Quadt	N 9/19,	104	(1.9)	Epoxy Plastic Tooling	News	1/3,		
Cold Heading	Clymer	N 9/19,	106	(2.0)	Automated Production Readies for Thin-	News	3/28,	22	(0.5)
Stamping	Higgins	N 9/19,	108	(2.0)	Film Circuits	News	5/9,	36	(1.0)
Deep Drawing	Schirmer	N 9/19.	110	(2.0)	Plasma Light Beam Disintegrates Metal	News	5/23.	14	
Spinning	Wenman	N 9/19.	112	(2.0)	Missile Quality Control	News			(0.6)
Roll Forming	Vanderplos	nar Tan			Built-In Heaters Cure Adhesive		6/20,	22	(0.5)
		N 9/19,	114	(2.0)		News	8/15,	8	(0.5)
Powder-Metal Forming	Johnson	N 9/19,	118	(2.0)	Mechanized Spray-Up Automates Glass- Fiber Panel Production	News	10/24,	14	(0.5)
Aluminum Hand Forgings	Favre	10/10,	172	(5.0)	Dish-Inflating Technique Makes Large		10/24,	4.4	(0.3)
Plastic-Deformation Processes	Kienzle	11/7.	200	(4.2)	Reflectors Feasible	News	11/21.	8	(0.6)

### **Design Theory and Techniques**

	MECHANICS, DYNAMICS,	VIBRATI	ON			Astronauts' Successes Changed Spacecraft	News	8/29,	3.4	10
	Motion Programing	Harrisberg	man 7 /	114	(6.0)	Design Philosophy	News	0/29,	14	10
	lighly Damped Structures	Ungar			(7.0)	for Man-to-Mars Trips Expandable Space Structures Likely to	News	10/24,	6	(1
ŀ	'rom Vibration Tests to System Param- eters	Macduff	3/14	1. 183	(8.0)	Be Telescoping	News	11/7,	6	(0
ľ	Doubly Overhung Shafts	Thurgood			(2.0)					
	orsional Critical Speeds	Rieger Strazzabos		1, 207	(3.0)	BASIC SCIENCE, RESEARC	Н			
		OU WARRED		. 122	(7.0)	Taming the Supermagnets	Callaghan	2/14,		
	Noise	News	2/14	. 12	(0.5)	Evaporation Losses	Sige! Barnes	3/28, 4/25,		
A	dvanced Syncom Fires for Home to Stay Stopped	News	5/99		(0.7)	Life On Other Planets	Barnes	6/6,		
H	ysteresis Absorbs Shock	Scan			(0.5)	Biomedical Engineering	Barnes		83	
						Stratoscope II	(Article) Barnes	7/18, 8/1,		
S	TRENGTH OF MATERIALS				-	Russians Fill In Radiation Belts New Theory of Matter: There's Nothing	News	2/14,	14	(
	ENVIRONMENT FACTORS					But Electrons Environment of Outer Space	News News	2/14.		
	hermal Stresses in Unrestrained Beams	Newman	1/3	, 133	(5.0)	Photos of Gaudy Bomber Shed Light on	News			
	erforated Plates	Bynum			(2.0)	Air Turbulence	News	4/11.		-
	ram Columns	Newman Westover			(4.0)	Multiplanet Flyby Deemed Feasible by '70 Did Thresher Take 130 mph Plunge?	News News	5/99, 8/15,		
r	nermal Stresses in Composite Beams				(3.0)	Food from Fusion: Key to Human-Race				
ľ	ermal Stresses in Laminated Circular Plates	Newman	3/28	177	(6.0)	Expansion?  Microscope Forms TV Pictures of Zero-	News	9/26,	14	
ž	dvanic Corrosion	Littlefield			(2.0)	Size Areas	News	10/10,		
r	sermal Stresses in Cylindrical Shells	Newman			(5.0)	Solar Radiation in Space Eccentric-Orbiting Imp Fills Gaps in	News	10/24,	22	-
	entact Stresses	Miller	7/18	, 185	(5,0)	Space-Radiation Data	News	12/19,		
	Weight Design	Micks			(3.7)	Flickering Images Improve Range Finder	DIA	7/4.		-
	ear Considerations in Design, Part 1	Lipson	10/24			Slotted Band Isolates Radiation	Scan	1/31, 2/14.		-
	ear Considerations in Design, Part 2 ear Considerations in Design, Part 3	Lipson Lipson			(9.0)	Refraction Indicates Error	Scan	10/24.		-
	ear Considerations in Design, Part 4 est-Buckling Deflection of Heated Rec-	Lipson	12/5	. 142	(6.0)	Complementary Images Indicate Alignment	Scan	12/19,	132	(
V.	tangular Plates	Newman Lipson	12/5		(3.0)					
	ckling in Rectangular Plates	Peach	12/19			EXPERIMENTAL DESIGN, DE	VELOPM	IENT		
ŽII	ised Surfaces Indicate Tension	Scan	3/14	168	(0.5)	Mockups: Plain and Fancy	Seminara	6/20.	152	i
						Two-Stage Launcher Propels Missile Models	DIA	2/14.		
H	UMAN FACTORS, INDUST	RIAL DE	SIGI	A		Realistic Simulator Flies Concepts and	M			
u	ited for Space	Barnes	1/17	128	(5.0)	Hardware Trick Signal Tickles Telstar into Talking	News	1/3,	8	
, E	rors Are Inevitable	Williams			(5.0)	Orbital Rendezvous	News	1/17.		-
	e Limits of Man	(Article)	1/31,		(6.0)	Three Days of Earth Orbiting	News	1/17.		-
	eativity on Campus				(6.0)	Thompson Designs Four for the 500 Space Capsule Readied for Ion-Engine	News	1/31,	6	•
	sollo: Three Men to the Moon	(Article)	9/12.		(1.0)	Tests	News	1/31,	6	6
ě!	ttle Guy Heads for the Big Time	(Article)	10/10,	160	(6.0)	Escape at 2500 mph	News	1/31,		
	dustrial Design	News	2/14,	24	(1.0)	Two-Passenger Moon Car Two Tilt Wings Get the Go-Ahead	News	2/14, 2/28,		0
	w Yorker Salon: 42 Accessories Are Standard	News	2/14,	30	(0.8)	Titan III: Engine Fires and Pad Con-				
er	to 400 Ft	News	4/11.	8	(0.5)	Test Boat Prepares To Set Hydrofoil	News	3/14.	8	(
u	turistic Auto Mockup Features New					Speed Records	News	3/28,		0
18	Controls lloon Parachute Keeps Astronaut From	News	4/25,	6	(1.0)	Impact Sled Simulates Real Auto Crashes Instant People Help Tune Philharmonic	News	3/28,	12	((
	Tumbling	News	4/25,	10	(0.5)	Hall	News	4/11,	8	(
11	ne Exposure Photos Measure Limits of Astronauts' Reach	News	5/9,	8	(0.7)	New Stress-Predicting Technique Air Breathing Wing Cuts Frictional Drag	News	4/11, 5/9,	6	
la	chine Talks to Man Through Sense	Manua	010	0	(0.7)	Home-Appliance Prototype Makes Sait				
ř	of Touchist-Mounted Life Preserver	News	6/6,		(0.7)	Water Drinkable	News News	5/9.	34	(1
la	n in a Centrifuge Sets Spin-Rate	\$1	0.00		(2.0)	Two Manned Stages Proposed for Delta-	TACMS	0/40,	44	
pa	Design Limit	News	6/20,	6	(1.0)	Wing Space Shuttle	News	7/18,	10	(
	Degrees of Freedom	News	7/18,	14	(0.5)	Hunting Subs	News	7/18,		
	Eight	News	9/12,	10	(0.6)	Two High-Speed VTOL's	News	7/18.	23	(0
nd	ustrial Design at WESCON	News	9/12,	22	(2.0)	Altitude	News	8/1,	6	((
e	Win Awards	News	11/21,	22	(1.0)	Military Begins Evaluation of First Tri- Service VTOL	News	8/15.	8	(6
u	mmies with Muscles Will Pass Judg-					Wingless, Maneuverable Vehicle	News	8/29,		(6
	ment on Spacesults	News	12/5,	6	(0.7)	Designed To Set a Speed Record	News	8/29,	23	(0
_						Practical Dream Car	News	9/12,	24	(0
E	SIGN ANALYSIS, SYNTHE	SIS				Tests	News	9/26,	8	(0
ob	umes of Elliptical Heads	Nelson	4/11,	219	(2.0)	Round-Trip Fare of \$25,000 to \$50,000	News	9/26,	22	(0
on	nputer-Calculated Environments	Arnold	4/25,		(5.0)	Air-Bearing Turntable Speeds Titan-III Model Testing	News	9/26.	30	(0
		Wambsganss			(2.0)	Side-Firing Rocket Furnishes Crosswind				
	alyzing Periodic Functions	Weiss Brockway	9/26, 10/24,		(3.0)	for Car Tests	News News	10/10, 11/7,		(0
	nding Taxis Sketched for Manned					Fallout Studies Continue at More Alti-	ATEMS	AR/E,	44	(0)
	Trips to Mars	News	6/20,			tudes	News	11/21,	10	(1
	e Near-Future Designs Pass the First	News	6/20,	44	(0.5)	Two Radical Racers Carry Studebaker's Indy-500 Hopes	News :	11/21.	14	(0
	The state of the s	News			(1.3)	First VTOL Jet			22	

## **Engineering Management**

DEPARTMENT OPERATIONS, PRODUCT DEVELOPMENT					'62 Salary Survey: Engineers Pay Up 8 Per Cent in 2 Years	News	7/18	. 8	(1.0
	NF				Computer Screens Applicants in Man-Job Matching Process	News	10/10	. 14	(0.8
Computers for Hire	Menegakis	~, ~,		(5.0)					
Patent Improvement or Infringement	Gray	1/31,			TECHNICAL INFORMATION				
Product Safety Analysis	Landers	2/28T			SPECIFICATIONS. DRAFT				
liability	Johnstone	3/14,							
Technical Consultant	Marvin	4/11,			Part Numbers vs Data Processing	Pohs			(6.6
The Cognizant Engineer	Murdick	4/25,		4	Functional Schematics	Feist		, 120	
Technical Economic Studies	Bael		182		Classification of Product Characteristics	Heyson	6/20		
New Product Program	Marvin		110	4	Microfilm-Yes or No?	Williams	9/12		
New Product Ideas	Baty		76		Materials Specification System	Pohs	10/10,		
Managing Engineering and Research	Karger	8/1,	76	(8.0)	ASTM Recognizes the Metric System	News	3/14,		
Organizing, Planning, and Budgeting the Research Program	Lewis	8/15,	98	(7.0)	Heat Develops Plastic Photos Instantly Executive Seminars and Technical Study	News	4/11,	12	(1.0
Control and Evaluation of the Research Program	Lewis	8/29.	97	(9.0)	Groups Highlight '63 Design Engi-	News	4/25.	14	(1.3
Patent Notices and Penalties	Gray	9/26.			meering Conference	Mens	2/40,	14	44.0
Forecasting Profitable Products	Marvin	10/24.		(5.0)	English	News	6/6.	12	(0.7
Patentability and Prior Publication	Gray	11/7.		(2.0)	Chinese-Translating Machine Interprets				
On the Increase: 'Commercial Fallout'	Gray	24/4,	1.00	(2.0)	Geometry of the Characters	News	6/20,	8	(0.6
from Space Programs	News	9/26,	28	(0.6)	National Data Center Planned as "Liv- ing Handbook"	News	8/1,	12	(1.0
MANACEMENT BERCONNEL	BECR				Remembering Typewriter Composes a		4412		
MANAGEMENT, PERSONNEL	, RECR	UITIN	IG		Standard Report	News	12/5,	14	(0.5
How Management Can Increase Engineer Efficiency	Raudsepp	1/3	88	(3.0)	PERSONAL				
Skills Inventory System	Parsons			(6.0)	FERSONAL				
The Peripatetic Professional 3: How To Attract Engineers	Raudsepp			(4.0)	Engineer Attitudes 4: Engineers Rate Themselves	Raudsepp	1/17.	123	(4.0
The Peripatetic Professional 4: How to					The Peripatetic Professional 1: Why En-	Raudsepp	1/31,		
Keep Engineers	Raudsepp Raudsepp			(3.0)	gineers Change Jobs	returnsepp	1/01,	.0	(0.0)
Hiring Engineers		3/28,		(4.0)	a New Job	Raudsepp	2/14.	120	(4.0
Communications and the Engineer 1:	Gray	3/28,	133	(2.0)	Personal Productivity	Stech	8/15,	105	(2.0
Company Communications	Raudsepp	4/11.	148	(5.0)	Why Retire the Leaders?	Raudsepp	11/7.	134	(4.0
Communications and the Engineer 2:		-1			How To Be a Better Manager	Howard	12/5,	112	(3.0
Management Reaction to Engineers' Suggestions	Raudsepp	4/25,	120	(5.0)	Making Supervisory Decisions	Brown	12/19,	103	(2.0)
Communications and the Engineer 3: Im- proving Engineer-Management Com-	Paudaian	* 10	100	(4.0)	PROFESSIONAL				
munications	Raudsepp	0/9,	130	(6.0)	Engineering Declarationalism 1, 4 9				
ing Information Flow	Raudsepp	5/23,	124	(3.0)	Engineering Professionalism 1: Are Engineers Professionalis?	Raudsepp	8/29,	94	(3.0)
vs Responsibility	Raudsepp	6/6,	115	(2.0)	Engineering Professionalism 2: Engineers' Place in Industry	Raudsepp	9/12,	140	(3.0)
	Raudsepp	6/20,	147	(3.0)	Engineering Professionalism 3: How Com- panies Can Promote Professionalism	Raudsepp	9/26,	146	(4.0)
	Raudsepp	7/4,	80	(1.0)	Engineering Professionalism 4: How Engineers Can Promote Professionalism	Raudsepp	10/10,	155	(4.0)
Employing Young Graduates 1: Establish- ing an On-Campus Image	Raudsepp	7/18,	128	(4.0)	Engineering Professionalism 5: The Image of a Professional	Raudsepp	10/24,	140	(3.0)
	Carter	7/18.	133	(4.0)	The Engineer in Society 1: How Society				
Employing Young Graduates 2: Keeping Young Engineers	Raudsepp	8/1.	84	(5.0)	Rates Engineers National Professional Registration	Raudsepp Constance	11/21, 11/21,		(4.0)
Engineer Utilization 1: How Well Are		12/19.			The Engineer in Society 2: What Makes Ivan Run?	Raudsepp	12/5.		
dore Pennies in the Pocket, and Other					Editor of Machine Design Honored by	-			
Pay Matters	News	1/17,	1.4	(0.0)	Record Number of Engineers Granted Ad-	News	12/5,	14	(0.5)
Engineering Salaries: Up S Per Cent in									

## Specific Machines and Equipment

AEROSPACE					Launching of Syncom II	News	8/29,	24	(0.5)
					Spacecraft Simulator Teaches Shuttle-				
SST by '70?	(Article)	4/11,	154	(6.0)	Run Flying	News	9/26,	6	(1.2)
Landing the Big Ones	(Article)	5/9,	200	(6.0)	Lockheed Starlifter	News	10/10,	22	(1.0)
EAA: Designers on a Budget	Barnes	9/26,	152	(6.0)	Quick-Detaching Gatling Gun Converts	**			
Gemini Status: 3 Months and Counting	Barnes	11/21.	156	(7.0)	Fighters into Bombers	News	10/24,	14	(0.5)
Fixed-Wing TFX	(Article)	12/19,	106	(2.0)	Space-Age Coolers	DIA	1/31	86	(5.0)
A New Conception of RIFT	News	1/3,	22	(0.5)	Sliding Ring Focuses Flying Saucer	DIA			
Rigid-Rotor XH-51A	News	4/11,	22	(0.5)	Thrust	DIA	5/9,	210	(1.0)
Formation Control	News	4/11.	23	(0.6)	Rotors	DIA	8/1.	96	(2.0)
Wheeled Pad Launches Pershing Missile	News	4/25,	8	(0.6)			0,4,	20	(4.0)
Corrugated Booster Launches Any Sub- orbital Test	News	5/9,	12	(0.4)	AUTOMOTIVE, RAIL				
Regions of Space	News	5/23,	14	(0.7)	Tomorrow's Bodies and Frames	Huntington	3/14.	144	(6.0)
Compact, Economy Cargo Carrier	News	7/18,	22	(0.5)	800 Left-Hand Turns	(Article)	5/23,		(7.0)
The Mach 2.2 Concorde	News	8/1,	23	(0.5)	The '64s	(Article)	9/26,		(9.0)

Monorail: Can Glamour Raily a Mass- Transit Revival?	Wise	11/7.	142	(7.0)	Modular Tanker Contains Two-Piece Tug- boat	DIA	4/23	, 132	(1.0)
Rail Transit Stages a Revival	Wise	11/21.	168	(5.0)	Airlock Backs-Up Underwater Portholes	DIA	4/25	, 133	(0.5)
Scout Camper Lets Four Rough It in Comfort	News	2/14,	12	(0.5)	Rolling Lifeboat	DIA	6/6	, 128	(2.0)
Two for Show and One to Go	News	2/28,	23	(0.5)	OTHER MACHINES FOUND	AFNIT			
Superpumper Water Stream Punches Holes in Concrete	News	5/23,	12	(0.8)	OTHER MACHINES, EQUIP	MENI			
Sports Trucks	News	9/26,	23	(0.6)	Projectiles Deflect to a Stop Inside				-0.00
Fast Runabouts Get Sportscar Steering	DIA	4/25,	133	(0.5)	Plastic Armor	News		, 10	
Cab "Quick-Disconnects" for Loader					Underground Movement	News	5/20		
Flexibility	DIA	8/15,	118	(2.0)	Light Section Microscope	News	5/23	, 23	(0.5)
Changes, Big and Small, in '64 Cars	DIA	10/10,	170	(1.0)	Close-Quarter Carpentry	News	6/6	, 23	(0.5)
Wag of Tail Turns Two-Piece Snow					A Ground-Effect Mine Detector	News	7/4	. 22	(0.6)
Cruiser	DIA	10/24,	154	(1.0)	Automatic System Puts Towns on the.				
Transporter "Crouches" to Load	DIA -	11/7.	152	(1.0)	Map	DIA	10/24	, 152	(2.0)
MARINE					Scoped Bolt-Action Pistol Wipes Out Varmints	DIA	11/21	, 163	(1.0)
					Conduction Maintains Cold	Scan	6 6	, 143	(1.0)
Propulsion for Hydrobatics	(Article)	6/20,		(3,0)	Light Reflects Profile	Scan	6/6	. 141	(1.0)
Deep-Diving Machines	Pritzlaff	8/29,	108	(7.0)	Air Swirls Segregate Materials	Scan	9/26	. 180	(0.5)
Mesoscaphe Submarine	News	9/12.	26	(0.5)		20.000			
Submarine-Launched Antisub Missile Passes Battle Tests	News	12/19,	8	(0.8)	Shadows Indicate Rotation	Scan		, 181	

